MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for January, 1900, is based on reports from about 3,103 stations furnished by paid and voluntary observers, classified as follows: regular stations of the Weather Bureau, 158; West Indian service stations, 12; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 27; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Canadian Meteorological Service, 32; Mexican Telegraph Service, 20; Mexican voluntary stations, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Señor A. M. Chaves, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Capt. J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

The month of December, 1899, closed cold in all districts east of the Rocky Mountains and the temperature continued abnormally low over the Southern and Eastern States during the first three days of January, 1900. On the morning of January 2 the line of freezing temperature was traced over the middle and east Gulf coasts and to Tampa, Fla., and the average fall in temperature over the Florida Peninsula during the preceding twenty-four hours had averaged 16°. As existing conditions indicated a still further fall in temperature, warning was given in the morning forecast of the 2d that heavy frost and freezing weather would occur in eastern Florida, except in the extreme southern portion, the night of the 2d. The morning reports of the 3d showed light frost as far south as Jupiter, Fla., and minimum temperature, 28°, at Tampa, and 22°, at Jacksonville, Fla.

From the 4th to the 23d unusually mild weather prevailed in the United States, and during this period a number of special advices and forecasts of continued moderate temperature were issued in the interest of shippers of perishable goods.

From the 24th to the close of the month a succession of cold waves crossed the Northwestern States, and during the 29th and 30th the minimum temperatures of this period were experienced in the Gulf and South Atlantic States, with freezing weather as far south as Tampa, the morning of the 30th.

Following a season of prevailing moderate weather the cold waves of the last week of January were severely felt, and the cold-wave signals that were displayed, and the special warnings that were issued, well in advance of their arrival, prevented the loss of valuable perishable property and goods in the central and northern districts, and enabled vegetable and fruit growers of the Southern States to adopt measures of protection which saved crops valued at thousands of dollars.

High winds and heavy rains prevailed in the north Pacific coast States during the first week of the month, and continued heavy rains and mild weather during the first half of the month caused floods in the rivers and streams of the middle and north Pacific coast States.

Severe gales visited the Great Lakes on the 7th, and during the night of the 24th and the day of the 25th. High winds and snow continued along the New England coast during the 1st, and strong gales prevailed on the north Atlantic coast on the 7th and 8th. During the 10th and 11th heavy rain in the middle and west Gulf States, the Ohio Valley, and Middle and South Atlantic States attended the advance of a disturbance from the west part of the Gulf of Mexico northeastward over the Ohio Valley. During the last ten days of the month several severe storms swept over the Atlantic coast districts.

Ample warnings were issued well in advance of all the severe storms of the month.

CHICAGO FORECAST DISTRICT.

During the mild weather which prevailed from the 3d to the 24th, long-range temperature forecasts were made from time to time, to the effect that mild temperature would continue several days. This information was of great value to shippers of perishable goods. On the 24th and 25th cold-wave signals were ordered well in advance of a cold wave which extended from the eastern Dakotas over the upper Mississippi Valley and the western Lake region. As this cold wave followed a prolonged mild spell the warnings were of great value to various interests. During the night of the 26th a severe cold wave developed in the extreme northwest, and the following morning cold-wave signals were ordered for the entire district with the exception of Montana and western portions of North Dakota and Colorado, and additional information was given that the cold wave would be exceptionally severe. The cold wave moved rapidly southward, causing intense cold over nearly the entire district. There was a temporary moderation of the cold on the 29th, but more severe weather immediately followed until the close of the month. The warnings which preceded the severe cold of the closing days of the month were of great benefit to shippers and the general public.

Several of the regular steamboat lines and car ferries continue service on Lake Michigan during the winter, and warnings of coming storms are sent to all open ports. That the advices have been heeded and proved of much value is shown by the fact that no casualties occurred to any vessel during the month of January, 1900, although several severe storms passed over the Lake region.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

The month opened with heavy rain along the California coast. The rain was accurately forecast, and, coming as it did after a period of comparatively dry weather, caused much satisfaction to agriculturists and stockmen.

The Sacramento and San Joaquin rivers rose rapidly, the river at Red Bluff reaching a stage of 20 feet, or 8 feet above the normal. The Sacramento River by the evening of the 3d had reached a stage of 23.5 feet and from this stage rose steadily until the 10th, when it reached its highest stage, 26.8 feet. But little damage was done, in part owing to the warnings given, and chiefly because of the absence of rain during the latter half of the month.

A strong norther on the nights of the 10th and 11th, prevailed in southern California. Some ripe oranges were blown from the trees. Frost occurred on January 11. From the middle to the end of the month tule fog prevailed in the Sacramento and San Joaquin valleys.—*A. G. McAdie, Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

The barometric depressions of the month developed rapidly and moved with great rapidity over British Columbia and the Northwest Territory. No severe wind storms occurred, although high winds prevailed on the 5th, 9th, 22d, and 23d.

Owing to heavy and continued rains and warm weather, the Willamette River rose very rapidly, beginning on the 12th. On the 14th the river at Portland approached the danger line and the forecasts were begun. Each succeeding stage was accurately predicted from twenty-four to forty-eight hours in advance, and the maximum stage forecast within 0.3 of a foot. As the lower wharfs were flooded and the cellar limit nearly reached, there was much anxiety along the river front, which was allayed by the forecasts and special information. Had warehousemen and others taken alarm much money might have been spent unnecessarily.—*G. N. Salisbury, Section Director.*

AREAS OF HIGH AND LOW PRESSURE.

During the month there were thirteen highs and the same number of lows which were sufficiently well-defined to admit of being charted. See Charts I and II.

Highs.—Nine of the highs were first noted in the British Northwest Territory, and the crests of four of these, Nos. I, II, XIII, and one section of No. XI moved southeastward either near or into the west Gulf States where they recurved to the eastward, Nos. I and II moving off the south Atlantic coast, and Nos. XI and XIII continuing up the coast beyond the field of observation. The second section of No. XI first appeared off the California coast, and after moving to Alberta, closely followed the path of the first section which it overtook in central Tennessee. No. III was first noted in southern California, moved to northern Lake Superior, and thence southeastward to the Atlantic by way of southern New York. No. IV remained in the middle Plateau from the evening of the 9th until the morning of the 13th with gradually diminishing intensity. No. VI moved along the Gulf coast disappearing into the ocean off the South Carolina coast. Nos. V, VII, VIII, and X moved over the extreme north without touching United States territory, except in northern New York and New England. No. IX first appeared in southern Illinois and disappeared in twenty-four hours off the North Carolina coast. No. XII originated in the British Northwest, moved south-southeastward to Texas, and thence eastward to Georgia where it disappeared.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	50	105	5, a. m.	33	78	3,625	4.0	906	37.8
II	3, a. m.	54	107	7, a. m.	37	75	3,175	4.0	794	33.1
III	5, p. m.	35	120	9, a. m.	43	74	3,075	3.5	878	36.6
IV	8, a. m.	41	124	9, p m.	42	115	875	1.5	583	24.3
V	9, a. m.	53	108	12, a. m.	48	54	2,775	3.0	925	38.5
VI	12, a. m.	29	96	14, p. m.	33	80	1,300	2.5	520	21.7
VII	13, p. m.	53	108	16, a. m.	46	60	2,650	2.5	1,060	44.2
VIII	14, a. m.	47	123	18, a. m.	45	64	3,275	4.0	819	34.1
IX	21, a. m.	37	89	22, a. m.	37	78	775	1.0	775	32.3
X	22, a. m.	54	114	25, a. m.	46	60	2,675	3.0	892	37.2
XI*	23, a. m.	38	123	29. a. m.	48	54	5,125	6.0	854	35.6
	24, a. m.	50	108				3,800	5.0	760	31.7
XII	26, a. m.	54	114	30, a. m.	33	84	2,950	4.0	738	30.7
XIII	29, p m.	53	108	†5, a. m.	48	54	4,300	6.5	662	27.6
Sums							40,375	50.5	11,166	465.4
Mean of 14 paths							2,884		798	33.2
Mean of 50.5 days									800	33.3
Low areas.										
I	3, p. m	51	104	5, a. m.	48	68	1,650	1.5	1,100	45.8
II	5, a. m.	48	125	7, p. m.	48	68	2,825	2.5	1,130	47.1
III	7, p. m.	48	125	10, a. m.	48	68	2,725	2.5	1,090	45.4
IV*	9, p. m.	51	114	12, a. m.	41	74	2,200	2.5	880	36.7
	8, p. m.	34	112				2,725	3.5	779	32.4
V	12, p. m.	53	114	14, p. m.	43	75	2,075	2.0	1,038	43.2
VI	14, a. m.	43	109	18, a. m.	40	87	2,800	4.0	700	29.2
VII	18, p. m.	30	88	21, a. m.	46	60	2,150	2.5	860	35.8
VIII	19, a. m.	53	105	20, a. m.	47	85	1,100	1.0	1,100	45.8
IX	20, p. m.	53	114	24, a. m.	48	54	2,925	3.5	836	34.8
X	22, p. m.	51	120	26, p. m.	48	68	3,225	4.0	806	33.6
XI	26, p. m.	49	97	28, a. m.	47	85	675	1.5	450	18.8
XII	27, p. m.	25	82	29, p. m.	48	68	1,975	2.0	988	41.1
XIII	28, a. m.	53	109	†1, a. m.	48	68	2,675	4.0	669	27.9
Sums							31,725	37.0	12,426	517.6
Mean of 14 paths							2,266		888	37.0
Mean of 37.0 days									857	35.7

*Considered as two in totals and means. †February.

Lows.—Of the thirteen lows, all but four were first noted on the extreme north Pacific coast or in the British Northwest Territory, and moved eastward through or north of the Lake region. Two of them, Nos. X and XIII, dipped down into southern New England and then turned sharply to the

northward. No. IV, after a slow movement over the British Northwest, advanced with greatly increased velocity from northwestern Lake Superior to western Pennsylvania, where it was joined by a second section, which first appeared in Arizona and had come up by way of southern Texas; the combined storm then moved off the New Jersey coast. No. VI originated in Wyoming, moved south-southeastward to extreme northeastern Mexico, thence north-northeastward to western Indiana, where it dissipated. No. VII was really a secondary development of No. VI, moving up from the western Gulf of Mexico to the westward of the Appalachian Range, over the lower Lake region, and thence east-northeastward. No. XII first appeared in extreme southern Florida, moved along the coast with steadily increasing intensity to New England, and finally disappeared north of the mouth of the St. Lawrence River. This storm and No. X developed the lowest pressures of the month.—*H. C. Frankenfield, Forecast Official.*

RIVERS AND FLOODS.

At the beginning of the month the Mississippi River was practically frozen over as far south as Cairo, Ill., and remained so during the entire month as far south as Leclaire, Iowa. Below Leclaire, however, the ice moved out on various dates, commencing on the 1st at St. Louis, Mo., and on the 20th at Davenport, Iowa. The gorge at St. Louis lasted but a single day; that at Chester, Ill., until the 6th; at Cairo until the 7th, while that at Hannibal, Mo., above the Wabash Bridge, remained until the 15th, the ice going out below the bridge, however, on the 7th. On the 29th the river was once more frozen over from St. Paul, Minn., to the bridge at Hannibal, and on the 30th there was floating ice as far as Cairo.

During the early days of the month new low water records were established at St. Louis and at Chester. At the former place a stage of —2.6 feet was recorded on the 2d, 1.9 feet lower than the record in any previous year, while at the latter place a stage of —4.1 feet was reached, 2.2 feet lower than that of any previous year.

Below the mouth of the Ohio the water fell until about the middle of the month, when a steady rise set in, which continued at the end of the month. South of Memphis, Tenn., and above New Orleans, La., the mean stage of water was over 5 feet higher than during December, 1899.

The Missouri was frozen during the entire month to above Omaha, Nebr., and at the latter place was closed by drift ice during the greater portion of the time. At Kansas City, Mo., the river was blocked from the 3d to the 5th, inclusive. At Hermann, Mo., 103 miles from the mouth of the river, there was a gorge from the 1st until the 7th, after which date the river was practically free from ice. Navigation was resumed at Hermann on the 15th and continued until the 29th, when it was again interrupted by ice.

The upper tributaries of the Ohio were closed by ice during the earlier days of the month, but were generally open by the 12th, and on the 16th navigation was resumed on the Monongahela as far as Greensboro, Pa. All river interests were warned of the coming of heavy ice by the official in charge of the Weather Bureau office at Pittsburg, Pa., and the necessary precautions were taken by those concerned.

The lower tributaries were also frozen until about the 10th, except the lower Tennessee, as was also the main stream from Wheeling to Parkersburg, W. Va., from the 2d until the 7th. A temporary gorge formed at Louisville, Ky., on the 1st. Floating ice was present in greater or less quantities throughout the most of the month, and navigation was interrupted at various times except during the middle of the month.

After the 10th of the month there was a decided rise in the Ohio, ending at Pittsburg on the 22d and at Cairo on the 30th. The mean stages of water were from 1.5 to 7.5 feet higher than during December, 1899, except at Pittsburg.

In the Tennessee River navigation out of Chattanooga, Tenn., was closed from the 1st until the 11th, although there was but little ice after the 6th. The Cumberland at Burnside, Ky., was frozen until the 8th, and navigation from Nashville, Tenn., to the upper river was interrupted by floating ice until the 12th.

No ice was reported in the Arkansas River east of Wichita, Kans., and none at that place after the first week of the month.

In the Hudson River the ice moved south from Albany, N. Y., on the 21st, and gorged at Cedar Hill, N. Y., remaining so at the close of the month. There was a slight freshet on the 22d, and special river forecasts were made for several days.

The ice in the Susquehanna River at Harrisburg, Pa., went out on the 19th and at Wilkesbarre, Pa., on the 22d, but on the 30th the river was again frozen over at the latter place and heavy floating ice was passing the former. The West Branch of the Susquehanna and the Juniata were practically frozen over until the 20th, and again during the last few days of the month.

There was considerable ice in the Potomac during the early portion of the month, and small gorges were reported 40 miles below Washington, D. C., seriously interfering with navigation. A gorge formed about the middle of the month in the upper river at Greenspring, W. Va., but moved away without causing any damage.

The James was frozen from the 1st to the 5th, inclusive, and heavy rains on the 19th and 20th caused a sharp rise in the river, necessitating the issue of a local flood warning at Richmond, Va., on the 20th, which was fully justified. There was also a considerable rise in the Roanoke at the same time, amounting to 22 feet at Weldon, N. C., but no flood stages occurred.

There was a decided rise in the rivers of South Carolina about the middle of the month, but nothing of particular interest resulted.

The Oostenaula River at Resaca, Ga., was frozen over from the 2d to the 6th, inclusive, and on the 3d and 4th at Rome, Ga.

The rivers of Alabama rose rapidly during the second decade of the month, and reached nearly to the danger line at Demopolis, Ala., on the Tombigbee River. Warnings were issued wherever necessary.

Owing to heavy rains, the Sacramento River was in flood during the early days of the month, and the danger-line stage of 23 feet at Red Bluff, Cal., was exceeded by 1.7 foot on the 3d. The river went out of its banks at noon of the 2d, and on the 4th broke through the levee in two places near Princeton, Cal. Warnings of this flood were issued by the official in charge of the Weather Bureau office at San Francisco, Cal., and were given wide distribution. At Sacramento, Cal., a stage of 27 feet was reached on the 9th, 2 feet above the river danger line, and the river remained above the 25-foot stage from the 6th until the 18th, inclusive.

The Willamette River was also at a flood stage about the middle of the month, reaching 24 feet at Albany, Oreg., 4 feet above the danger line, and 16.7 feet at Portland, Oreg., 1.7 foot above danger line. Ample and accurate warnings of this flood were given by the official in charge of the Weather Bureau office at Portland.

The heavy rains also caused severe floods in the smaller rivers in Idaho and eastern Washington. About the 13th several lives were reported lost at Kendrick, Idaho, where the Potlatch River and Bear Creek converge into a narrow canon.

The damage to railroad and other property was estimated at $500,000.

The thickness of ice in the rivers since December 4, 1899, is given in the following table. A few places show an increase since January 1, 1900, while some show a decrease, indicating a mild winter season. At the close of January, 1899, there were 3 inches of ice as far south as Kansas City, Mo., and 26 inches at La Crosse, Wis., while at the end of January of the current year there were but 9 inches at La Crosse, and very little below. Albany, N. Y., which had 10 inches at the end of January, 1899, had but 2.5 inches at the corresponding time of this year.

The highest and lowest water, mean stage, and monthly range at 125 river stations are given in Table XI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Thickness of ice in rivers (in inches), winter of 1899–1900.

Stations.	December.				January.				
	4	11	18	25	1	8	15	22	29
Moorhead, Minn					12.0	19.0	21.0	24.0	26.0
Williston, N. Dak	1.0	1.5	6.0	8.0	16.0	16.0	16.0		21.0
Bismarck, N. Dak			1.5	9.0	16.0	17.0	17.0	15.0	17.0
Pierre, S. Dak			1.5	3.5	14.0	15.0	10.5	8.0	14.0
Yankton, S. Dak			5.0	7.0	10.0	11.0	10.5	8.5	10.0
Sioux City, Iowa				1.5	10.0	8.0	6.0		
Omaha, Nebr					10.0				
St. Paul, Minn					12.5		20.0	16.0	18.0
La Crosse, Wis				5.0	10.0	9.0	7.5	6.0	9.0
Dubuque, Iowa			4.0	5.0	12.0	10.5	10.0		
Davenport, Iowa					8.0	9.0	6.0		
Keokuk, Iowa					10.0		5.0		
Hannibal, Mo					8.0				
Topeka, Kans					6.5				
Wichita, Kans					2.0				
Pittsburg, Pa					4.0				
Parkersburg, W. Va					1.0	2.0			
Louisville, Ky					5.0				
Columbus, Ohio					7.0	1.0			3.0
New Brunswick, N. J						6.0			2.5
Bangor, Me			2.0	2.0	4.5	8.0	9.0	12.0	14.0
Albany, N. Y					4.0	5.0	8.5		2.5
Harrisburg, Pa						3.0	3.0		
Philadelphia, Pa					2.0	2.0			
Washington, D. C					5.0				
Lynchburg, Va					4.0	2.0			

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

Alabama.—The mean temperature was 44.0°, or 0.6° below normal; the highest was 74°, at Opelika on the 9th, and the lowest, 6°, at Valleyhead on the 1st. The average precipitation was 3.34, or 1.68 below normal; the greatest monthly amount, 5.81, occurred at Citronelle, and the least, 0.78, at Tallassee.—*F. P. Chaffee.*

Arizona.—The mean temperature was 49.3°, or 5.1° above normal; the highest was 90°, at Arivaca on the 7th, and the lowest, 8° at Fort Defiance on the 29th. The average precipitation was 0.24, or 0.55 below normal; the greatest monthly amount, 1.10, occurred at Dragoon, while none fell at a number of stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 43.4°, or 4.6° above normal; the highest was 78°, at Washington on the 24th, and the lowest, 1°, at Pond on the 29th. The average precipitation was 2.69, or 2.40 below normal; the greatest monthly amount, 5.59, occurred at Jonesboro, and the least, 0.29, at Prescott.

The condition of wheat is reported to be excellent.—*E. B. Richards.*

California.—The mean temperature for the State, obtained by weighting the reports from 184 stations, so that equal areas have about the same weight, was 47.9°, which was 3.6° above the January normal for the State, as determined from 152 records; the highest was 90°, at Irvine, Orange County, on the 18th; the lowest, 12° below zero, at Bodie, Mono County, on the 9th. The average precipitation for the State, as determined by the records of 186 stations, was 3.30; the deficiency, as indicated by reports from 155 stations, which have normals, was 1.21; the greatest monthly amount, 12.27, occurred at Upper Mattole, Humboldt County, while none fell at Salton, Riverside County.—*G. H. Willson.*

Colorado.—The mean temperature was 29.3°, or 5.4° above normal; the highest was 74°, at Los Animas on the 23d, and the lowest, 23° below zero, at Gunnison on the 11th. The average precipitation was 0.23, much below normal; the greatest monthly amount, 1.73, occurred at Ruby, while none fell at Garnet, Los Animas, and Vilas.—*F. H. Brandenburg.*

Florida.—The mean temperature was 55.9°, or 1.9 below normal; the highest was 84°, at Nocatee on the 10th, and the lowest, 13°, at Stephensville on the 4th. The average precipitation was 3.25, or 0.45 above normal; the greatest monthly amount, 5.25, occurred at Fort Meade and Lemon City, and the least, 0.44, at Wausau.—*A. J. Mitchell.*

Georgia.—The mean temperature was 44.3°, or 1.1° below normal; the highest was 75°, at Jesup on the 7th and 8th, and the lowest, 5°, at Dahlonega on the 2d and 30th. The average precipitation was 2.91, or 1.83 below normal; the greatest monthly amount, 5.64, occurred at Clayton, and the least, 1.65, at Augusta.

The weather during the month was favorable for farming and fruit interests.—*J. B. Marbury.*

Idaho.—The mean temperature was 30.1°, or 4.2° above normal; the highest was 63°, at Oakley on the 14th, and the lowest, 18° below zero, at Chesterfield on the 1st. The average precipitation was 1.52, or 0.37 below normal; the greatest monthly amount, 8.45, occurred at Kootenia, and the least, trace, at Oakley.—*S. M. Blandford.*

Illinois.—The mean temperature was 31.7°, or 5.4° above normal; the highest was 71°, at Shobonier on the 13th and at Raum on the 14th, and the lowest, 12° below zero, at Scales Mound on the 31st. The average precipitation was 1.27, or 1.07 below normal; the greatest monthly amount, 2.41, occurred at Equality, and the least, 0.16, at Philo.

Winter wheat is thus far thought to be unharmed, for the plant previous to the cold period at the end of the month was in splendid condition, green and vigorous.—*C. E. Linney.*

Indiana.—The mean temperature was 32.6°, or 5.6° above normal; the highest was 67°, at Mount Vernon on the 15th and 17th, and the lowest, 8° below zero, at Valparaiso on the 30th and at Hammond on the 31st. The average precipitation was 1.71, or 1.28 below normal; the greatest monthly amount, 4.20, occurred at Vevay, and the least, trace, at Hammond.

The mild weather during the month was very favorable for winter crops and farm work. The cold weather during a few days at the beginning of the month apparently caused but little injury, although most fields were without snow covering. Moderate temperature and occasional rain improved wheat in many fields not injured by the hessian fly, and made the wheat look green and vigorous. Freezing and thawing had caused some wheat fields to look brown, but the roots are firm and healthy. In some fields in the southern portion the wheat never looked better at the time of the year.—*C. F. R. Wappenhans.*

Iowa.—The mean temperature was 25.6°, or about 8.5° above normal; the highest was 66°, at Ottumwa on the 4th, and the lowest, 20° below zero, at Ruthven on the 29th. The average precipitation was 0.53, or 0.69 below normal; the greatest monthly amount, 2.47, occurred at Mooar, and the least, trace, at several stations.

January was phenomenally mild and pleasant, with much less than the usual number of stormy and wintry days. During a portion of the first half of the month the soil in the central and southern district was unfrozen, and for a number of days plowing operations were carried on in numerous localities. The conditions were especially favorable for stock feeding, and securing the forage in the cornfields.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

Kansas.—The mean temperature was 35.3°, or 6.6 above normal; the highest was 75°, at Coolidge on the 13th, and the lowest, 8° below zero, at Colby on the 28th. The average precipitation was 0.22, or 0.63 below normal; the greatest monthly amount, 1.06, occurred at Yates Center, while none fell at Emporia, Lakin, Lebanon, and Scott.

The ground continued moist through the month, and much of the spring plowing was done during the warm weather. Wheat is in very good condition; much of it has been pastured to prevent stooling; some

of the more tender wheat was hurt by the cold snap at the close of the month.—*T. B. Jennings.*

Kentucky.—The mean temperature was 37.2°, or 2.0° above normal; the highest was 77°, at Alpha on the 17th, and the lowest, 8° below zero, at Loretto on the 28th. The average precipitation was 2.80, or about 1.50 below normal; the greatest monthly amount, 4.94, occurred at Owenton, and the least, 1.65, at Williamsburg.

Wheat was in splendid condition up to the last week, and it is not believed that it has been injured to any serious extent by the cold weather, as it was vigorous and well rooted. The general opinion is that it is uninjured, and the crop is in the best condition for the season for many years. The fruit crops, especially peaches, many fear, have been injured by the cold spell at close of the month, following the two weeks of unusually warm weather; this, however, is problematical, as no very severe temperatures have been reported. Farm work is well up and stock are generally in very good condition. The present outlook for farming operations is very encouraging, and farmers throughout the State are very hopeful.—*H. B. Hersey.*

Louisiana.—The mean temperature was 50.0°, or 1.1° below normal; the highest was 79°, at L'Argent on the 24th, and the lowest, 12°, at Plain Dealing on the 29th The average precipitation was 4.77, or 1.16 below normal; the greatest monthly amount, 10.68, occurred at Hammond, and the least, 1.60, at Lawrence.

The weather during the month was favorable for farming operations; a great deal of plowing has been done for potatoes, corn, and cotton, and a vast amount of work has been accomplished in the rice growing districts.—*W. T. Blythe.*

Maryland and Delaware.—The mean temperature was 33.8°, or 1.8° above normal; the highest was 69°, at Cumberland, Md., on the 23d, and the lowest, 8° below zero, at Deerpark, Md., on the 4th, and at Sunnyside, Md., on the 31st. The average precipitation was 2.43, or 0.60 below normal; the greatest monthly amount, 3.79, occurred at Seaford, Del., and the least, 1.34, at Westernport, Md.

The cold wave that prevailed at the close of December and the beginning of January was somewhat damaging to wheat, there having been but little protection afforded by snow covering. Alternate freezings and thawings toward the close of the latter month lifted the soil and exposed the roots in many localities. As a whole, however, the weather conditions have been favorable. Most fields present a fresh green color, and on good soil the surface is hidden by a thick and vigorous growth. The hessian fly has been observed in nearly all districts, and while damage from this source can not be determined until the coming spring, the view held by correspondents is that it will then be confined, for the most part, to the early sown wheat.—*F. J. Walz.*

Michigan.—The mean temperature was 24.8°, or 3.8° above normal; the highest was 59°, at Berrien Springs on the 24th, and the lowest, 26° below zero, at Gladwin on the 31st. The average precipitation was 1.31, or 1.14 below normal; the greatest monthly amount, 3.99, occurred at Berrien Springs, and the least, a trace, at Port Austin.

This is the warmest January for eight years, and the driest one on record (thirteen years). On the 24th thunderstorms occurred quite generally in the southern counties, very unusual phenomena in Michigan during January. The snowfall has been light for the month and very light since the beginning of winter, greatly retarding logging and lumbering operations in the northern woods.—*C. F. Schneider.*

Minnesota.—The mean temperature was 18.4°, or about 8.0° above normal; the highest was 61°, at Milan on the 19th, and the lowest, 38° below zero, at Pokegama on the 31st. The average precipitation was 0.48, or about 0.25 below normal; the greatest monthly amount, 1.27, occurred at St. Charles, and the least, trace, at Lake Jennie.—*T. S. Outram.*

Mississippi.—The mean temperature was 45.5°, or slightly below normal; the highest was 78°, at Waynesboro on the 16th, and the lowest, 9°, at Ripley on the 2d and 3d. The average precipitation was 3.10, or about 2.50 below normal; the greatest monthly amount, 8.16, occurred at Bay St. Louis, and the least, 1.20, at Aberdeen.—*H. E. Wilkinson.*

Missouri.—The mean temperature was 34.5°, or 5.5° above normal; the highest was 77°, at Mount Vernon on the 15th, and the lowest, 9° below zero, at Maryville on the 28th. The average precipitation was 1.23, or 1.10 below normal; the greatest monthly amount, 5.21, occurred at New Madrid, and the least, trace, at Conception.

The snowfall of the month was remarkably light, very few stations in the central and northern sections reporting more than a trace, while in the southern sections, where the heaviest falls occurred, the total for the month was generally less than 1 inch. The greatest local monthly fall was 2.0 inches at Sarcoxie.

Winter wheat was injured very little by the cold spell at the close of December, and the weather from January 4th to 25th being exceptionally mild, the crop continued in excellent condition until the latter date, but during the cold weather of the last six days of the month the fields were unprotected by snow and some damage by freezing is reported. The mild temperature and light precipitation were favorable for outdoor work, and considerable plowing was done for spring crops.—*A. E. Hackett.*

Montana.—The mean temperature was 28.4°, or 8.9 above normal; the highest was 68°, at Fort Benton on the 18th, and the lowest, 25° below zero, at Harlem on the 28th. The average precipitation was 0.31, or 0.62 below normal; the greatest monthly amount, 2.51, occurred at Ovando, while none fell at Corvallis, Poplar, and Twin Bridges.

The weather has been very beneficial to the stock interests of the State; ranges have been entirely free from snow, and stock has remained in good condition without being fed hay.—*E. J. Glass.*

Nebraska.—The mean temperature was 30.2°, or about 10.0° above normal; the highest was 72°, at Loup on the 18th, and the lowest, 18° below zero, at Lynch on the 31st. The average precipitation was 0.07, the least recorded during the past 25 yea s, and 0.56 below normal; the greatest monthly amount, 0.82, occurred at Plattsmouth, while none fell at several stations in the southern and western portions of the State. Very little snow fell, and the ground has been uncovered the whole month.—*G. A. Loveland.*

Nevada.—The mean temperature was 35.7°, or about 7.4° above normal; the highest was 71°, at Candelaria on the 13th, and the lowest, 10° below zero, at Fenelon on the 10th. The average precipitation was 0.42, or about 0.91 below normal; the greatest monthly amount, 1.00, occurred at Elko, while none fell at several stations. The month was remarkably fine, mild, and pleasant.—*J. H. Smith.*

New England.—The mean temperature was 23.8°, or 2.1° above normal; the highest was 62°, at Voluntown, Conn., on the 20th, and the lowest, 28° below zero, at Fairfield, Me., on the 4th. The average precipitation was 4.59, or 0.71 above normal; the greatest monthly amount, 11.15, occurred at Bar Harbor, Me., and the least, 2.61, at Northfield, Vt.—*J. W. Smith.*

New Jersey.—The mean temperature was 32.4°, or 2.5° above normal; the highest was 66°, at Ocean City on the 25th, and the lowest, 5° below zero, at Charlotteburg on the 30th. The average precipitation was 3.85, or 0.19 above normal; the greatest monthly amount, 5.50, occurred at Oceanic, and the least, 2.37, at Tuckerton.

The conditions were very unfavorable for winter wheat, rye, and grasses. The frequent freezing and thawing caused much heaving of the ground, exposing the roots. The fields of grain look poor and thin, especially on high ground.—*E. W. McGann.*

New Mexico.—The mean temperature was 38.9°, or 4.7° above normal; the highest was 71°, at Mesilla Park on the 24th, the lowest, 5°, at Bluewater on the 2d, Espanola on the 28th, and East Las Vegas on the 29th. The average precipitation was 0.45, or 0.12 below normal; the greatest monthly amount, 1.35, occurred at Socorro, while at Cambray none was recorded..—*R. M. Hardinge.*

New York.—The mean temperature was 25 1°, or 2.4° above normal; the highest was 62°, at Bedford on the 19th, and the lowest, 20° below zero, at Lake Placid on the 1st. The average precipitation was 3.20, or 0.19 below normal; the greatest monthly amount, 6.56, occurred at Jamestown, and the least, 1.23, at Fleming.

The weather during January was not favorable for winter wheat. Over probably one-third of the State it suffered to some extent by lack of snow protection and sudden changes in temperature, the plant in places appearing brown and lifeless. About two-thirds of the correspondents, however, reported wheat in good condition at the close of the month. In many localities the outlook was very promising. Many correspondents report a good covering of snow during the entire month. Meadows were injured by heaving. Stock is wintering well. Much good ice was harvested during January.—*R. G. Allen.*

North Carolina.—The mean temperature was 40.5°, or nearly normal; the highest was 75°, at Cherryville on the 16th, and the lowest, 3° below zero, at Linville and Marshall on the 2d. The average precipitation was 3.33, or 1.00 below normal; the greatest monthly amount, 6.24, occurred at Wilmington, and the least, 1.26, at Marshall.

The condition of winter wheat generally remained excellent, though some damage was reported in consequence of the freezing temperatures at the first and last days of the month. The open winter encouraged considerable activity among farmers, and work in preparation for an early truck season is well advanced in the east.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 16.0°, or 12.8° above normal; the highest was 70°, at Medora on the 19th, and the lowest, 30° below zero, at Pembina and Woodbridge on the 30th, and at Bottineau, Minto, and Power on the 31st. The average precipitation was 0.21, or 0.35 below normal; the greatest monthly amount, 0.90, occurred at Pembina, and the least, trace, at Coalharbor, Ellendale, Oakdale, and Willow City.—*B. H. Bronson.*

Ohio.—The mean temperature was 31.1°, or 3.1° above normal; the highest was 67°, at Thurman on the 23d, and the lowest, 20° below zero, at Millport on the 29th. The average precipitation was 2.37, or 0.58 below normal; the greatest monthly amount, 4.81, occurred at Lowell, and the least, 0.35, at Dupont.

Correspondents from a few northwestern counties report the general prospect of the wheat crop to be good, and a few along the Ohio Valley state that the month has improved the prospect, but generally the outlook is reported to be very discouraging for even a fair yield.—*J. Warren Smith.*

Oklahoma.—The mean temperature was 41.3°, or 3.5° above normal; the highest was 82°, at Fort Sill on the 14th, and the lowest, 2°, at Tahlequah on the 1st. The average precipitation was 0.69, or 0.88 below normal; the greatest monthly amount, 1.74, occurred at Tahlequah, and the least, 0.23, at Stillwater.

The month afforded most favorable weather conditions for the growth of winter wheat. The continued moderately cool nights and excess in cloudiness caused a slow growth and good root development of the plant. Wheat is generally reported in excellent condition and affording abundant pasturage in many places to the stock. Plowing for oats is in progress, and some sowing has been done. The ground is mostly in good condition for the progress of work.—*C. M. Strong.*

Oregon.—The mean temperature was 40.5°, or 5.7 above normal; the highest was 78°, at Klamath Falls on the 3d, and the lowest, 2°, at Lonerock and Joseph on the 28th. The average precipitation was 5.05, or about 0.50 below normal; the greatest monthly amount, 17.75, occurred at Glenora; and the least, trace, at Burns.

The month was so open that quite a large amount of plowing and seeding was done on dry land. Altogether the grain prospects at the end of January have never been better, as, in general, it is well rooted and stooled, vigorous, and of good color.—*G. N. Salisbury.*

Pennsylvania.—The mean temperature was 29.8°, or 2.0° above normal; the highest was 63°, at Coatesville on the 23d, and the lowest, 8° below zero, at Smethport on the 29th and at Butler on the 31st. The average precipitation was 2.64, or 0.70 below normal; the greatest monthly amount, 4.37, occurred at Warren, and the least, 1.36, at Towanda.

Grain at the close of the month appeared to have wintered well, and its general condition was a fair average.—*T. F. Townsend.*

South Carolina.—The mean temperature was 44.0°, or 0.6 below normal; the highest was 75°, at Beaufort on the 8th and 23d, and the lowest, 3°, at Liberty on the 2d. The average precipitation was 2.43, or 1.61 below normal; the greatest monthly amount, 5.65, occurred at Georgetown, and the least, 1.58, at Statesburg.

Wheat and oats were not materially injured by the freezing weather at the opening of the month, and if injured by the freeze at the close of the month the damage was not apparent. Plowing was quite general during the month, in preparation for spring planting.—*J. W. Bauer.*

South Dakota.—The mean temperature was 23.7°, or about 11° above normal; the highest was 68°, at Chamberlain on the 19th, and the lowest, 25° below zero, at Howard and Ladelle on the 31st. The average precipitation was 0.11, or about 0.57 below normal; the greatest monthly amount, 0.66, occurred at Spearfish, while none fell at Cherry Creek, Howard, Mitchell, and Wentworth.—*S. W. Glenn.*

Tennessee.—The mean temperature was 39.3°, or about 2.0° above normal; the highest was 70°, at Springfield on the 16th, and the lowest, 10° below zero, at Erasmus on the 2d. The average precipitation was 2.91, or 2.07 below normal; the greatest monthly amount, 4.98, occurred at Iron City, and the least, 1.31, at Bluff City.

The only growing crop of special importance during January was winter wheat, which made encouraging progress, and the condition at the end of the month, as a rule, was above the average for this period.—*H. C. Bate.*

Texas.—The mean temperature, determined by comparison of 46 stations distributed throughout the State, was 1.5° above the normal; the highest was 86°, at Beeville on the 8th, and the lowest, 5°, at Anna on the 29th. The average precipitation, determined by comparison of 51 stations distributed throughout the State, was 0.58 above the normal. Nearly normal conditions prevailed along the immediate coast, over the panhandle, the extreme western portion of west Texas, and the northwestern portion of central Texas, while there was a deficiency ranging from about 1.00 to 3.34 over north and east Texas. Over the other portions of the State there was an excess, ranging from 1.00 to 3.79, with the greatest in the vicinity of San Antonio. The greatest monthly amount, 9.13, occurred at Alvin, and the least, trace, at Fort Ringgold.

The month of January was generally favorable for farming operations and much farm work was done. Vegetables along the coast were damaged some by frost and freezing weather at the close of the month, especially where unprotected. Wheat, rye, and oats are doing well and the weather was very favorable for these crops. The wheat crop is reported to be in fine condition generally.—*J. L. Cline.*

Utah.—The mean temperature was 31.6°, or 7.4° above normal; the highest was 70°, at Elgin on the 15th, and the lowest, 10° below zero, at Fort Duchesne on the 13th. The average precipitation was 0.43, or 0.73 below normal; the greatest monthly amount, 1.25, occurred at Fillmore, while none fell at Castledale. It was the warmest and driest January on record.—*L. H. Murdoch.*

Virginia.—The mean temperature was 36.6°, or slightly above normal; the highest was 76°, at Fontella on the 14th, and the lowest, 5° below zero, at Burkes Garden and Marion on the 4th. The average precipitation was 2.69, or 0.72 below normal; the greatest monthly amount, 5.08, occurred at Rocky Mount, and the least, 1.36, at Grahams Forge.

The progress of the crops throughout the month was satisfactory; winter wheat was generally reported as well rooted and making good growth.—*E. A. Evans.*

Washington.—The mean temperature was 38.3°, or 5.9° above normal; the highest was 71°, at Bridgeport on the 7th and 8th, and the lowest, 1° below zero, at Northport on the 27th. The average precipitation was 3.65, or 0.86 below normal; the greatest monthly amount, 18.18, occurred at Clearwater, and the least, 0.25, at Centerville and Ritzville.—*A. B. Wollaber.*

West Virginia.—The mean temperature was 34.5°, or 2.6° above normal; the highest was 74°, at Cairo on the 15th, 17th, and 22d, and the lowest, 10° below zero, at Oceana on the 1st. The average precipitation was 2.24, or 0.72 below normal; the greatest monthly amount, 3.60, occurred at Point Pleasant, and the least, 0.82, at Burlington.

Wheat and winter oats were reported as looking very well over the State, although complaint is made in some of the northern counties of the hessian fly. In the southern counties, during the mild spell, farmers commenced plowing for corn and oats.—*E. C. Vose.*

Wisconsin.—The mean temperature was 21.8°, or about 7.0° above normal; the highest was 57°, at Racine on the 5th, and the lowest, 26° below zero, at Medford on the 31st. The average precipitation was 0.97, or about 0.50 below normal; the greatest monthly amount, 2.50, occurred at Beloit, and the least, 0.18, at Heafford Junction.—*W. M. Wilson.*

Wyoming.—The mean temperature was 26.4°, or 4.3° above normal; the highest was 70°, at Cody on the 13th, and the lowest, 19° below zero, at Burns on the 1st. The average precipitation was 0.23, or about 0.45 below normal; the greatest monthly amount, 0.93, occurred at Bedford, while none fell at Lusk, Fort Laramie, and Wamsutter.—*W. S. Palmer.*

SPECIAL CONTRIBUTIONS.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined list of titles has been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Scientific American. New York. Vol. 82.
—— Recent Balloon Ascensions near Paris. P. 59.

Science. New York. N. S. Vol. 11.
Hilgard, E. W. Prevention of Hail. P. 153.

Aeronautical Journal. London. Vol. 4.
—— Valveless Balloon Voyage. P. 99.
B., H. A. Scientific Research in Aeronautical Problems. P. 101.
Spencer, P. Photography from Balloons. P. 103.
—— Dr. K. Danilewsky's Aerial Experiments. P. 98.
—— Forthcoming International Aeronautical Congress. P. 105.
—— Application of Wireless Telegraphy to Balloons. P. 108.

Geographische Zeitschrift. Leipzig. 6 Jahrg.
Halle, E. von. Die klimatische Verteilung der Industrie. P. 10.

Symon's Monthly Meteorological Magazine. London. Vol. 34.
—— Low Barometric Pressure on December 29, 1899 [England]. P. 177.
—— Severe Frost in December, 1899. P. 181.

Meteorologische Zeitschrift. Berlin. Band 16.
Trabert, W. Die Bekämpfung der Frostgefahr. P. 529.
Lesshaft, E. Der Einfluss der Wärmeschwankungen des Norwegischen Meers auf die Luftcirkulation in Europa. P. 539.
Hellmann, G. Zur täglichen Periode der Windgeschwindigkeit. P. 546.
Blasius, R. Wilhelm Blasius. P. 555.
Kremser, V. Klima von Hannover. P. 558.
Hegyfoky, J. Die Bewölkung in den Ländern der ungarischen Krone. P. 559.
Hergesell, H. Täglicher Gang der Windgeschwindigkeit zu Strassburg. P. 566.
Konrad, V. Ueber den Wassergehalt der Wolken. P. 566.
Richarz, F. Bemerkung über die Temperaturdifferenzen in auf- u. absteigenden Luftströmen. P. 567.
Hann, J. Temperaturmittel für Südafrika. P. 568.
Dufour, H. Versuche und Beobachtungen über das Gefrieren des Wassers. P. 569.
Gonzalez D. Resultate der meteorologischen Beobachtungen in der Republik Guatemala 1856 bis 1898. P. 570.

Zeitschrift für Luftschiffahrt. 18 *Jahrg.*
Assmann, R. Eine neue Form des "Ballon sonde." P. 281.
Tuma, Dr. Josef. Beiträge zur Kenntniss der atmosphärischen Elektricität. Luftelektricitätsmessung im Luftballon. P. 286.
Nimfuhr, Raimund. Flugtechnische Betrachtungen. P. 293.
Nature. London. Vol. 61.
—— The Old and New Kinetic Theory. (Review of Meyer's "Kinetic Theory of Gases" and Burbury's "Treatise on the Kinetic Theory of Gases"). P. 289.
MacDowall, Alex. B. Compensation in Weather. P. 295.
Drygalski, E. v. German Antarctic Expedition. P. 318.
Webb, S. and Stokes, G. G. Effects of Lightning upon Electric Lamps. P. 343.
Ciel et Terre. Bruxelles. 20me Année.
Hildebrandsson, H. Recherches sur les centres d'action de l'atmosphère. II. P. 529.
Scientific American Supplement. New York. Vol. 49.
—— Kite Meteorograph Construction and Operation. (Condensed from "Kite Meteorograph Construction and Operation" by Prof. C. F. Marvin). P. 20166.
University of Tennessee Record. No. 11.
Fulton, Weston, M. An Electric Recording River Gage. P. 232.
National Geographic Magazine. Washington. Vol. 11.
Frankenfield, H. C. Kite Work of the Weather Bureau. P. 55.
Das Wetter. Berlin. 17 *Jahrg.*
Assmann, R. Die Sonnenstrahlung. P. 1.
Berson, A. Ein unveröffentlichter Brief des Cartesius, betreffend die Erfindung des Barometers. P. 8.
Journal of the Western Society of Engineers, Chicago. Vol. 4.
Stewart, C. B. Discharge Measurement of the Niagara River at Buffalo, N. Y. P. 450.
Gaea. Leipzig. 36 Jahrg.
Trabert, W. Die Bildung des Hagels. P. 162.
Scottish Geographical Journal. Edinburgh. Vol. 16.
Milne, A. D. Dry Summer on the Upper Nile. P. 89.
Appleton's Popular Science Monthly. New York. Vol. 56.
Cook, Orange. Ribbon Lightning. P. 587.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.

Mexican data for January, 1899.

Stations.	Altitude.	Mean barometer.	Temperature. Max.	Min.	Mean.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Cloud.
	Feet.	*Inch.*	°*F.*	°*F.*	°*F.*	%	*Inch.*		
Culiacán Rosales (E. d. S.)	112	29.53	86.7	52 2	70.9	60	......	ne.	ne.
Durango (Seminario)	6,243	24.04	79.7	27.7	53.8	49	......	....	sw.
Leon (Guanajuato)	5,934	24.30	76.3	32.4	56.3	58	0.06	n.	w.
Mazatlan	25	29.96	78.1	59.9	71.4	72	0.00	nw.	w.
Mexico (Obs. Cent.)	7,472	23.05	72.5	37.4	55.4	55	0.02	n.	w.
Morelia (Seminario)	6,401	23.98	76.8	41.0	58.1	63	0.09	sw.	w.
Puebla (Col. Cat.)	7,112	23.37	76.6	35.2	58.1	65	......	ene.	sw.
Saltillo (Col. S. Juan)	5,399	24.78	69.4	32.5	50.0	68	2.29	s.	sw.
San Isidro (Hac. de Guanajuato)	......	....	68.9	50.9	......	......	T.	w.	....
Silao	6,063	24.29	72.5	40.8	59.2	52	0.01	nw.	w.
Zacatecas	8,015	22.52	71.6	28.4	50.2	52	......	e.	....
Zapotlan	5,078	25.11	77.4	39.7	61.0	55	T.	se.	w.

CONTRIBUTIONS TO THE METEOROLOGY OF PANAMA.

By Gen. HENRY L. ABBOT, dated Paris, February 8, 1900.

I send herewith in Table 1 the hourly temperatures and barometric pressures at Alhajuela on the Upper Chagres, as observed by the officers of the new Panama Canal Company, during October, November, and December, 1899. In Table 2 I give the hourly temperatures during the last six months of the year 1899 at La Boca, the new landing place of the Panama railroad, near Panama. These observations, with those already sent you for July, August, and September, 1899, (see MONTHLY WEATHER REVIEW, October, 1899, p. 463), as compared with similar data at Colon obtained by your own observer (see MONTHLY WEATHER REVIEW, May, 1899, pp. 201–3) give a very interesting and complete knowledge of this extraordinary climate. At Alhajuela the extreme range of the barometer was only about three-tenths of an inch in these six months, and the extreme range of the thermometer was only 30.5° Fahrenheit.

TABLE 1.

1899.	Temperatures. October.		November.		December.		Barometric pressures. October.		November.		December.	
	°*C.*	°*F.*	°*C.*	°*F.*	°*C.*	°*F.*	*Mm.*	*Ins.*	*Mm.*	*Ins.*	*Mm.*	*Ins.*
1 a.m.	23.8	74.9	24.4	75.9	23.3	73.9	760.5	29.94	759.5	29.90	760.0	29.92
2 a.m.	23.6	74.5	24.2	75.6	23.0	73.4	760.2	29.93	759.2	29.89	759.6	29.91
3 a.m.	23.4	74.1	24.1	75.3	22.8	73.0	760.0	29.92	759.1	29.88	759.5	29.90
4 a.m.	23.2	73.8	23.9	75.0	22.6	72.7	760.1	29.93	759.2	29.89	759.6	29.91
5 a.m.	23.1	73.5	23.8	74.9	22.4	72.4	760.4	29.94	759.4	29.90	759.8	29.91
6 a.m.	23.0	73.3	23.8	74.8	22.2	72.0	760.7	29.95	759.7	29.91	760.1	29.93
7 a.m.	23.8	74.8	24.5	76.1	22.5	72.5	761.0	29.96	760.1	29.92	760.5	29.94
8 a.m.	25.8	78.5	26.2	79.1	24.9	76.8	761.3	29.97	760.4	29.94	760.8	28.95
9 a.m.	28.2	82.8	28.0	82.4	28.0	82.4	761.6	29.98	760.6	29.94	760.9	29.96
10 a.m.	29.2	84.6	29.1	84.4	29.4	84.8	761.4	29.98	760.5	29.94	760.9	29.96
11 a.m.	30.2	86.2	29.8	85.6	30.2	86.3	761.0	29.96	760.0	29.92	760.5	29.94
Noon	30.2	86.3	30.1	86.3	30.5	87.0	760.6	29.94	759.4	29.90	759.9	29.92
1 p.m.	29.5	85.1	30.2	86.5	30.6	87.1	760.1	29.93	758.8	29.88	759.4	29.90
2 p.m.	29.1	84.3	29.9	85.8	30.4	86.8	759.7	29.91	758.4	29.86	759.0	29.88
3 p.m.	28.4	83.2	29.1	84.4	30.3	86.5	759.4	29.90	758.3	29.85	758.8	29.88
4 p.m.	27.6	81.8	28.2	82.8	29.7	85.4	759.4	29.90	758.4	29.86	758.9	29.88
5 p.m.	26.8	80.3	27.4	81.4	28.5	83.2	759.6	29.90	758.7	29.87	759.1	29.89
6 p.m.	26.2	79.2	26.6	79.9	27.0	80.6	759.9	29.92	759.0	29.88	759.5	29.90
7 p.m.	25.7	78.3	26.0	78.8	26.1	79.0	760.4	29.94	759.4	29.90	760.0	29.92
8 p.m.	25.3	77.5	25.6	78.1	25.2	77.4	760.8	29.95	759.8	29.92	760.4	29.94
9 p.m.	24.9	76.9	25.3	77.5	24.8	76.7	761.1	29.96	760.2	29.93	760.6	29.95
10 p.m.	24.6	76.3	25.0	77.0	24.3	75.7	761.2	29.97	760.3	29.93	760.7	29.95
11 p.m.	24.3	75.8	24.8	76.6	23.9	75.1	761.2	29.97	760.1	29.93	760.6	29.94
Midnight	24.1	75.4	24.5	76.2	23.6	74.5	760.9	29.96	759.8	29.92	760.2	29.93
Means	26.0	78.8	26.4	79.6	26.1	79.0	760.5	29.94	759.5	29.90	760.0	29.92
Maxima	34.4	93.9	33.0	91.4	33.0	91.4	763.0	30.04	763.1	30.04	763.5	30.06
Minima	21.9	71.4	22.5	72.5	18.9	66.0	757.8	29.84	756.0	29.76	757.0	29.80

NOTE.—The original temperatures and pressures were given to the hundredths, and the conversions agree therewith.

Reduction of observations made at Boca, near Panama, by the self-registering thermometer of M. Royer. Every day of these months is represented in these figures except six days in July.

TABLE 2.

Hours.	Temperatures. July.		August.		September.		October.		November.		December.		Means.	
	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
1 a.m.	24.3	75.8	22.6	72.8	23.5	74.2	23.6	74.6	23.7	74.7	23.8	74.8	23.6	74.5
2 a.m.	24.1	75.3	22.4	72.3	23.2	73.8	23.3	73.9	23.5	74.2	23.3	74.0	23.3	73.9
3 a.m.	23.8	74.9	22.2	71.9	23.0	73.4	23.0	73.4	23.2	73.8	24.0	73.4	23.0	73.5
4 a.m.	23.6	74.6	22.0	71.5	22.8	73.0	22.7	72.9	23.0	73.4	22.6	72.7	22.8	73.0
5 a.m.	23.5	74.2	21.8	71.2	22.6	72.7	22.6	72.6	22.8	73.1	22.4	72.3	22.6	72.7
6 a.m.	23.3	73.9	21.6	71.0	22.5	72.4	22.4	72.3	22.6	72.8	22.1	71.8	22.4	72.4
7 a.m.	23.4	74.2	21.5	70.8	22.4	72.2	22.2	72.0	22.4	72.4	21.9	71.4	22.3	72.2
8 a.m.	24.3	75.7	21.7	71.1	22.9	73.2	22.4	72.3	22.6	72.7	21.9	71.4	22.6	72.7
9 a.m.	25.5	77.9	22.7	72.9	24.1	75.3	23.7	74.6	23.4	74.2	23.1	73.6	23.8	74.8
10 a.m.	26.8	80.3	24.1	75.3	25.2	77.4	24.6	76.3	24.6	76.4	24.8	76.6	25.0	77.0
11 a.m.	27.9	82.3	25.4	77.6	26.4	79.6	25.6	78.1	25.7	78.2	26.3	79.3	26.2	79.2
Noon	28.6	83.5	26.2	79.2	27.4	81.2	26.4	79.5	26.4	79.6	27.4	81.3	27.1	80.7
1 p.m.	29.2	84.5	26.7	80.0	27.9	82.3	27.1	80.8	27.1	80.8	28.3	82.9	27.7	81.9
2 p.m.	29.3	84.8	26.8	80.2	28.2	82.8	27.4	81.4	27.6	81.7	28.8	83.9	28.0	82.4
3 p.m.	29.0	84.3	26.4	76.6	28.0	82.4	27.2	81.0	27.7	81.9	29.0	84.2	27.9	82.2
4 p.m.	28.7	83.7	26.0	78.8	27.6	81.7	26.9	80.4	27.6	81.7	29.0	84.3	27.6	81.8
5 p.m.	28.3	82.9	25.7	78.3	27.0	80.6	26.6	79.8	27.2	81.0	29.0	84.3	27.3	81.2
6 p.m.	27.5	81.5	25.3	77.5	26.5	79.8	26.2	79.2	26.7	80.0	28.7	83.7	26.8	80.3
7 p.m.	26.8	80.3	24.9	76.8	25.9	78.7	25.7	78.3	26.1	78.9	28.0	82.4	26.2	79.2
8 p.m.	26.2	79.0	24.4	76.0	25.4	77.7	25.3	77.5	25.6	78.1	27.2	81.0	25.7	78.2
9 p.m.	25.5	78.0	24.0	75.2	24.9	76.8	24.9	76.9	25.2	77.3	26.4	79.5	25.2	77.3
10 p.m.	25.1	77.2	23.6	74.5	24.5	76.0	24.6	76.3	24.8	76.6	25.5	78.0	24.7	76.4
11 p.m.	24.8	76.6	23.3	73.9	24.1	75.4	24.2	75.6	24.4	76.0	25.0	76.9	24.3	75.7
Midnight	24.5	76.0	23.0	73.3	23.8	74.9	23.9	75.0	24.1	75.3	24.3	75.7	23.9	75.0
Means	26.0	78.7	23.9	75.1	25.0	77.0	24.7	76.4	24.9	76.9	25.5	77.9	25.0	77.1
Maxima	32.9	91.2	30.9	87.6	32.5	90.5	30.1	86.2	31.2	88.2	31.4	88.5	31.5	88.7
Minima	20.9	69.6	20.0	68.0	20.6	69.1	21.0	69.8	20.6	69.1	20.1	68.2	20.5	69.0

Table 1 shows the reduction of observations made at Alhajuela by self-registering thermometer and barometer. Each day of these respective months is comprised in these observations. Alhajuela is about 18 kilometers above Gamboa, following the course of the river. The instruments are about 43 meters above sea level. The table is continued from page 463 of the October REVIEW.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made partly in accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

Meteorological observations at Honolulu, January, 1900.

The station is at 21° 18′ N., 157° 50′ W.
Pressure is corrected for temperature and reduced to sea level, and the gravity correction, –0.06, has been applied.
The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force or amounts of cloudiness, connected by a dash, indicate change from one to the other.
The rainfall for twenty-four hours has always been measured at 10:29 p. m., not 1 p. m., Greenwich time, on the respective dates.
The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2:29 a. m., Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.80	66	63.5	79	65	62.3	74	w.	3-0	1	29.84	29.74	0.00
2	29.86	64	62	79	62	61.3	73	w.	1	3	29.88	29.78	0.03
3	29.98	62	58.5	77	63	58.7	69	w.	2	2	29.98	29.90	0.00
4	30.00	61	60	79	60	59.0	71	w-n.	2-0	1-6-0	30.04	29.94	0.00
5	29.92	61	59.5	76	59	60.0	73	sw-w.	2	5	30.03	29.92	0.00
6	29.85	61	60	77	61	60.7	70	w-n.	1-0	6	29.92	29.84	0.06
7	29.84	70	65	77	59	63.0	83	se-sw.	1	6	29.92	29.81	0.05
8	29.97	68	66	80	64	65.7	76	ssw-sw.	2	6	29.97	29.84	0.04
9	30.05	64	60.5	79	67	66.5	82	sw-se.	1-4-0	7	30.09	29.96	0.00
10	30.04	71	68	81	63	62.5	72	sw-n.	1	1	30.13	30.00	0.01
11	29.99	72	66	80	69	64.5	71	ne.	3	3	30.09	29.99	0.00
12	30.00	72	65	78	71	63.3	69	ene-nne.	3	5	30.09	29.99	0.00
13	30.03	72	65	79	71	61.3	64	ne.	4	4	30.05	29.98	0.01
14	29.98	69	63.5	78	72	61.5	64	ene.	5	2	30.08	29.94	0.00
15	29.94	71	65	80	68	62.0	66	ne-se.	3-0	4-8	30.06	29.94	0.00
16	29.98	66	64	79	66	62.0	66	sw-w.	1-4	2-8	29.97	29.85	0.15
17	30.09	67	57	72	66	57.0	67	nnw-n.	3-5	3	30.09	29.95	0.00
18	30.10	69	61	75	66	51.5	52	nne.	3-6	3-1	30.16	30.05	0.00
19	30.05	71	63	76	68	56.5	60	ne.	5	3	30.15	30.03	0.00
20	30.02	70	63	78	69	58.3	61	ene.	4	3	30.08	29.99	0.00
21	29.95	71	64	77	69	60.7	64	ne.	3	3-5	30.04	29.94	0.00
22	29.94	68	63.5	79	69	61.3	64	ne-e.	3-1	4	30.01	29.91	0.00
23	29.95	61	59	78	65	61.5	74	e-sw.	1	9-0	30.02	29.90	0.00
24	29.99	66	64.5	79	60	61.5	75	sw-ne.	1	8-2	29.99	29.90	0.16
25	29.94	60	58	76	64	63.7	80	n-ne.	1	8-3	30.01	29.90	0.00
26	30.01	62	60.5	76	59	53.7	67	n.	1	5	30.04	29.94	0.04
27	30.08	62	57.5	70	61	57.5	74	nne.	2	8	30.10	30.00	0.05
28	30.11	65	60	75	61	55.5	63	ne.	1	2-8	30.18	30.06	0.00
29	30.05	64	57	77	63	57.3	66	nne.	2	5	30.13	30.01	0.08
30	29.97	68	60.5	75	50	52.5	54	nne-n.	3	1	30.06	29.97	0.00
31	30.03	67	63	76	66	56.7	62	ne.	5	4	30.03	29.97	0.06
Sums.	......	......	......	......	......	......	......	....	......	......	......	......	0.74
Means.	29.98	66.4	62.0	77.3	64.7	60.0	68.6	....	2.5	4.1	30.040	29.934	....
Departure.	+.043	......	......	......	......	–2.5	–8.0	....	......	–0.4	......	......	–2.46

Mean temperature for January, 1900 (6+2+9) ÷ 3 = 70.5°; normal is 70.1°. Mean pressure for January (9+3) ÷ 2 is 29.992; normal is 29.949.
* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 7:29 p. m., Greenwich time. ‡ These values are the means of (6+9+2+9) ÷ 4. § Beaufort scale.
Taking the sums of November and December, 1899, and January, 1900, the rainfall was the least on record (26 years) for the said months.

SOME OF THE RESULTS OF THE INTERNATIONAL CLOUD WORK FOR THE UNITED STATES.[1]

By FRANK H. BIGELOW, Professor of Meteorology.

The general scheme of the survey of the clouds proposed by the International Cloud Commission is so widely understood that it will not be necessary to describe it again, beyond saying that the observations undertaken by the United States Weather Bureau began on May 1, 1896, and ended on June 30, 1897, employing 1 primary base station, at Washington, D. C., and 14 nephoscope stations, distributed quite uniformly throughout the territory east of the Rocky Mountains. The computation of the resulting data and the arrangement for the publication follow closely the prescribed forms submitted in the circulars of the commission, and although the labor of preparation up to this point was considerable, there will be nothing of special interest to say regarding that portion of the report, the whole of which will form Part VI of the Report of the Chief of the Weather Bureau for 1898.

The possession of much new data, contained in the 6,600 single theodolite observations and in the 25,000 nephoscope observations, afforded, however, a favorable opportunity for considering several of the fundamental problems of meteorology, especially in view of the fact that they develop in the most perfect manner on the North American Continent, and therefore the discussion of the observations has been pushed far beyond the limits implied in the scheme of the commission. It will be admitted, no doubt, by all those who are conversant with the true state of meteorology that, in spite of much good work on the part of able investigators, there are still serious gaps in the series of facts needed to construct a sound theory of the history of cyclones and anticyclones; and, furthermore, that the existing theories are neither in agreement among themselves nor with all the known facts. It was important, therefore, to develop the facts regarding the circulation of the atmosphere without bias *ab initio;* and it was essential to so far correlate the existing mathematical analyses that their true relation as to one another and as to the results of the observations should appear. Meteorology must always remain, not a crude branch of science, as some writers erroneously maintain, but a difficult one, on account of the complications attending the physical processes and the fluid motions in the complex form presented by the atmosphere. We have attempted to show how some of the apparent obstacles can be overcome by employing the methods used in these observations and reductions, and the results are such as to stimulate students to continued efforts to finally resolve these interesting problems.

A STANDARD SYSTEM OF CONSTANTS AND FORMULÆ.

Part of the difficulty in making students generally realize that meteorological mathematics already stands upon a definite fundamental basis, is due to the fact that while many papers of great merit exist, they are detached from one another, and there is no well-defined system of formulæ which is common to all such related investigations. Professor Ferrel's treatises, it is true, in spite of his inattention to a consistent and clear notation, cover the ground, as he conceived the solution of the problem, in a consecutive order from beginning to end. Yet many of his primary developments are exceedingly complicated; other valuable mathematical analyses have been discovered since his day; his main theory of the local cyclone has been found to be loaded with objections, so that students have expected that before long improvements would be introduced. The German school of authors, including Guldberg and Mohn, Oberbeck, Sprung, Hann, and others, have followed substantially one line of thought, which is characteristic of them, and though they reach many results in agreement with Ferrel's, especially in regard to the general cyclone covering a hemisphere of the earth, they have in reality radically different conceptions regarding the structure of the local cyclone. Thus, in Ferrel's case, it was assumed that the general and the local cyclone are examples of the same type of circulation, wherein

[1] Reprinted from American Journal of Science, December, 1899.

the inner and the outer regions of the cyclone are separated by a region where the gyratory velocity about the central axis is reduced to zero, having a positive direction inside and a negative direction outside in the lower strata, with a complete reversal as to gradient and direction in the upper strata, the entire system embracing the same fluid material in a continuous motion. The German school, on the other hand, began with the principle of the logarithmic potential, of which a common example is found in the motion of the ether as an electric current through a wire which is surrounded by a magnetic whirl. In this case there is no reversal of the direction of the gyratory motion, but instead of being a minimum at the boundary of the inner and the outer regions, it is there a maximum. The inner region is distinguished from the outer, however, by the fact that it alone has a vertical motion. This is evidently an entirely different type of local cyclone from Ferrel's. In the case of the general cyclone the American and the German schools are in much closer accord. Furthermore, some important difficulties arose from the attempt to account for the energy expended in the local cyclone on the theory of a vertical convection due to the buoyancy of air expanded by the latent heat liberated in large quantities by the condensation of aqueous vapor into water. Also, some observations discussed by Dr. Hann seemed to show that the distribution of the temperature in the upper strata of cyclones and anticyclones is not consistent with the principles of the vertical convectional theory. Since there exists this lack of harmony as to the main theory of the motions of the atmosphere, it is no wonder that progress has been very slow in reducing meteorology to a strictly scientific basis on its theoretical side. Accompanying this confusion in the theory, the authors have seldom been fortunate enough to adopt the same notation for their mathematical discussions, so that the study of this subject has been unusually wearisome to all those who have had no strong motive for undertaking such work.

It seemed to me, therefore, desirable to construct a standard system of equations covering the entire subject, and to transpose the most important papers into that system, at least to such an extent that a student would have but little trouble in following the writings of one author and comparing the others, by means of this exposition. Several original solutions covering important ground have been introduced, with the object of bringing the formulæ into practical working forms. These include the development of the equations of motion in rectangular, cylindrical, and polar coordinates, the treatment of the humidity term in the barometric formulæ, the transformation of the thermodynamic equations in the stages represented by the α, β, γ, δ, processes in the formation of clouds, and in the treatment of the equation of continuity by which the vertical component of motion is connected with the horizontal in the case of the local cyclone. A complete new series of tables, adapted to practical work, was computed from these sets of formulæ, and applied throughout the discussion of the cloud observations.

THE WEATHER BUREAU TABLES.

As a basis for the construction of the new tables, a system of the constants employed in meteorology was selected, and many of the immediate minor relations defined by suitable brief formulæ, the entire set showing numerous useful cross connections between the several parts. The primary constants are substantially those adopted by the International Committee, and they are so arranged in parallel columns for the metric and the English systems as to be convenient for reference; the logarithms of the numbers are also given. Many minor problems in meteorology, which are often obscure in a wordy exposition, are readily explained by means of these defining formulæ, since these are more definite than any general explanation.

In preparing to discuss the physical processes which occur in the several cloud strata at heights ranging from the surface to an elevation of at least 15,000 meters, wherein the pressure B, the temperature t, and the vapor pressure e, pass through great changes, it was found that the existing tables were wholly inadequate for the purpose. The International and the Smithsonian barometric tables extend only to 2,000 meters, but the new tables are computed in metric measures from 0 to 15,000 meters: viz, for temperatures ranging from $-40°$ C. to $+40°$ C., for $h=0$ to 5,000 meters; from $-50°$ to $+30°$ for $h=5,000$ to 10,000 meters; and from $-60°$ to $+20°$ for $h=10,000$ to 15,000 meters; similar tables have been made in English measures up to 10,000 feet, which is sufficient for our weather map reduction. There are certain practical difficulties with the existing tables in other particulars. The formula employed by them is of the form, $B_0-B=B(10^m-1)$, where $B_0>B$, and m is a function of the temperature, humidity, gravity, altitude, and surface topography. This gives the correction which, added to the pressure B at a given altitude, will reduce it to B_0, the pressure at sea level. It is perceived that this is a very special case of reduction, namely, downward to sea level, whereas in cloud work we must be prepared to reduce upward as well as downward, and also where neither pressure is that at sea level. If by the above formulæ we wish to reduce upward, it must be done through approximations, because the value of B at the upper station is involved in the formula, and not the value of B_0 with which we begin. There is trouble with the humidity term, especially in the Smithsonian tables, where a certain average value of the vapor pressure is included permanently within the m, so that the humidity does not stand out by itself, and is, therefore, not available for an independent discussion. But in cloud work this is the very element most required, and it is not proper to assume either an invariable law of variation of the vapor contents, nor, as in the International Tables, is it possible to measure the humidity term at the top and bottom of a column which is not in contact with the ground. For example, in reducing from the bottom to the top of a cumulus cloud, I have taken the following form of equation,

$$\log B_0=\log B+m-\beta m-\gamma m,$$

where m includes the temperature, the altitude, and the topographic terms, β the humidity and γ the gravity. What is wanted is the value of B_0, and not the correction B_0-B, which involves one superfluous operation in computing. The humidity term with its assumed law of vertical variation, and the gravity term here stand out distinctly by themselves, and the whole subject of humidity is easily open to treatment, and even to employing a different law without disturbing the main term, which is limited to the dry air pressures. By simple transformation the formula is available for reduction upward; this may take place between any two fixed points whatsoever; the set of special tables to determine the heights by the barometric pressure is dispensed with entirely, since the m table is arranged for double entry with the arguments, h = height, t = temperature; with h, t, m, any two being given, the other follows. These new tables give identical results with the others for special cases; they work rapidly in practice; one can compute with accuracy to the one-hundredth of a millimeter, so far as the data are concerned.

The second important group of tables contains the four thermodynamic processes, which take place in the formation of clouds, the unsaturated, the saturated, the freezing and the frozen stages, designated as the α, β, γ, δ, stages, respectively. This subject has been discussed by Ferrel, Hann, Lord Kelvin and others along one line, and by Hertz and von Bezold

along another line, though both came to the same conclusion so far as the results are concerned. Hertz has constructed a diagram which graphically deals with the four stages, but it was necessary for him to neglect in part the vapor contents, so that although the divergence is no more than 7^{mm} of pressure between the rigorous and the approximate solutions, yet all the fine accuracy which should pertain to good cloud computations is sacrificed. The direct application of the rigorous formulæ, which are very complex, would require an excessive amount of labor to use them, and they are never utilized by meteorologists. But it seemed to me essential to overcome this obstacle, and accordingly the formulæ were transformed so as to depend upon three arguments, B, t, $\frac{e}{B}$, namely, pressure, temperature, and the ratio of the vapor pressure to the barometric pressure. The tables are simple in structure, and involve only moderate interpolations. They work rapidly and have proven to be perfectly satisfactory by use in the actual reductions. The results of this discussion have led to much definite information regarding the physics of clouds in many connections, but only a few of them can be mentioned here.

(1) In the case of air rising from the lower strata to form cumulus clouds there exists a definite level at which saturation takes place, namely the base of the cloud. It is necessary to clearly distinguish between true adiabatic saturation, and the saturation as it takes place in the atmosphere. The formulæ of the tables as they stand deal only with adiabatic processes, but in order to apply them to the atmosphere the value of the ratio $\frac{e}{B}$ must be observed at the base of the cumulus cloud. In the adiabatic process the ratio $\frac{e}{B}$ is constant in the unsaturated stage, that is from the ground to the cloud base, and by two or three easy approximations, after starting with B, t, and e at the ground, we compute B_s, t_s, and e_s and the height h_s of saturation. Now the question is, does this computed height h_s agree with the measured height of the cumulus base $h_{,}$? The result of our work is to show that the observed height $h_{,}$ is greater than h_s. We must, therefore, determine the values $B_{,}$, $t_{,}$, $e_{,}$, at the base of the cloud accurately, and thus find the relation between the adiabatic $\frac{e}{B}$ and the actual $\frac{e_{,}}{B_{,}}$. A considerable number of kite ascensions were made in the summer of 1898 by the Weather Bureau, and more than 100 cases occurred in which the B_k, t_k, c_k, h_k, were measured by the kite meteorographs on entering the base of the cloud. These have enabled us to study this important question carefully. It may be stated that four distinct ways have been developed for finding the temperature quite approximately at the cloud base, and hence the vapor tension and the pressure, so that for usual conditions, that is to say excepting the strongly stratified condition which occurs when currents of very different temperatures flow over one another, we can compute the pressure at the height of a mile with an error usually of ± 0.02 and always of less than ± 0.04 inch, which insures good map drawing at that height. The determination of the divergence of the actual from the adiabatic atmosphere is valuable in its application to several meteorological problems.

(2) It has been assumed that the value of the ratio $\frac{e_{,}}{B_{,}}$ obtained for the base of the cumulus cloud holds true throughout the cloud itself, and that in this space the adiabatic laws prevail. The theodolite measurements give the height of the top of the cloud where the process of saturation ends. The saturated or β stage has two cases for consideration, the first being where the top of the cloud is lower than the beginning of the freezing stage, and the second where it passes into or through that stage. We computed the B', t', e', h', at the top of the cloud in the first case, but the corresponding B_0, t_0, e_0, h_0, at the bottom of the freezing or γ stage in the second case. Then the thickness of the γ stage with the value of B°, t°, e°, h°, at the top of it followed, these being the same as $B_{,,}$, $t_{,,}$, $e_{,,}$, $h_{,,}$, the bottom of the frozen or δ stage. Finally with the observed $h_{,,,}$, the top of the cloud, $B_{,,,}$, $t_{,,,}$, $e_{,,,}$, were computed. This gives the heights at which the several stages begin and end, and hence the thickness of each stage; thence the gradients of B, t, e, per 100 meters in each stage were computed and tabulated. The work was so arranged as to deal with the mean normal meteorological elements prevailing in each of the 12 months, so that the annual variations in all these quantities were found. Also selected cases, as of the towering cumulo-nimbus clouds, some of which reach to 14,000 meters, were computed throughout. The details are so instructive that several of the computations are reproduced in full. The tops of the lofty cumulo-nimbus give a temperature of —30° or —40° C. in several cases, and of —59° C. in one high cloud. This method of computing the temperature at the top of lofty clouds is a welcome addition to the method of the balloon ascensions for determining the meteorological elements in the highest strata, since the clouds may be considered as accurate sounding gages. The mean heights of the stages show that the γ stage begins at about $\frac{e'}{B'} = 0.0090$ and develops as a wedge-shaped space up to a thickness of about 500 meters for $\frac{e'}{B'} = 0.0300$. In this the hail forms, and especially in summer when t, e, h, have large values. I am inclined to think that the stratified appearance of hailstones is due to the fall through a series of these γ spaces alternating with warmer β stages, which may form at different heights in the congested state of the atmosphere accompanying thunderstorms, rather than to any vertical orbital circulation such as Ferrel suggested. At every point of these computations the checks are so perfect that we can work accurately to 1 millimeter of pressure and to 0.1° C. temperature, when the trial approximations are repeated two or three times.

(3) It is a most interesting problem to determine just how much heat must be added to an ideal adiabatic atmosphere to produce the actual atmosphere in the several levels. Two preliminary discussions were required to develop this subject. The first was to determine the normal distribution of temperature as observed each month at all altitudes up to 16,000 meters. For this purpose all the available results of balloon ascensions were collected and discussed by tabular and graphic methods, involving a balanced network of mutually dependent lines, by which the average temperature topography was made up to that elevation. Upon the reliability of these observations and this method of treatment the accuracy of the results required must depend. The second discussion was the determination of the mean heights of the several types of clouds from the stratus to the cirrus in each month of the year. This was found by means of the theodolite observations at Washington, D. C., and from them the region covered annually by each kind of cloud was carefully mapped out. Beginning with the mean meteorological elements $B.$ $t.$ $e.$ at the surface for each month, purely adiabatic values were computed at the required heights; and then the actual state of the atmosphere was computed by using the temperatures derived from the balloon ascensions. Subtracting these values at the same heights, the difference is the quantity of heat required. In integrating $\int \frac{dQ}{T_m}$ I was obliged in this preliminary work to regard T_m as constant, and to take as its value the mean of the adiabatic and the observed temperatures. The formula employed is,

$$\int dQ = Q = T_m \left[\begin{array}{l} \left(.2374 + .1512\frac{e}{B} + .0232\frac{e^2}{B^2}\right)\log T \\ -\left(.2374 + .1512\frac{e}{B} + .0232\frac{e^2}{B^2}\right)\log T_0 \\ \qquad -\left(.06858 + .02592\frac{e}{B}\right)\log B \\ \qquad +\left(.06858 + .02592\frac{e}{B}\right)\log B_0 \end{array} \right]$$

the upper terms being the observed and the lower adiabatic. In computing, the dry air and the vapor terms for temperature and for pressure, four in all, were carried through separately; finally the values for each 1,000-meter level were interpolated, so that we have in a table the calories required to effect the change from an adiabatic to the actual atmosphere. This is at least a fair effort to elucidate quantitively the problem of the absorption of heat by the earth's atmosphere. Its interest and importance would justify a special campaign of operations devoted to its more careful study.

THE MOTIONS OF THE ATMOSPHERE.

Besides these mathematical discussions and physical researches, a considerable portion of our labor was expended upon the determination of the stream lines and vectors of motion, which occur throughout anticyclonic and cyclonic regions in the United States. The complexity of this subject is so great that it is necessary to refer the reader to the charts of the report itself for a complete presentation of the result. We had two sources of information to depend upon, namely, the long series of cloud charts which are used in the daily forecasts, but are not published, and the nephoscope observations of the international cloud year. These charts contain blue arrows, showing the direction of motion of the lower or cumulus clouds, and red arrows giving the direction of the upper or cirrus clouds. The United States was divided by me into six areas, the northern Rocky Mountain region, the Lake region, the New England districts, the southern Rocky Mountain region, the west Gulf States, and the South Atlantic States, for the purpose of discussion. Then for high and low areas respectively in each district, for winter and also for summer a set of composite charts was constructed by placing a transparent sheet of paper over a series of the maps, selected to show the same weather type for each district, and tracing in the arrows, from which finally a set of resultant vectors for equal squares was computed by counting the number of compass point directions thus recorded. From 40 to 70 maps were used in making each chart, and the resulting vectors were reduced to an average of 40 vectors in each square. If the frequency of direction is proportional to the prevailing movement of the air, then we obtain a chart of relative motions in all parts of the high and low areas. The result is most instructive in many respects, of which a few are mentioned. The wind and the lower cloud circulation up to the strato-cumulus type are quite the same in form, though the cloud level is rather more rounded; this movement is nearly independent of the upper cloud region, which is due eastward, or only a little sinuous over the highs and lows. This is true of ordinary cyclones, but in the case of hurricanes for the South Atlantic States the penetration of the lower circulation into the higher is very pronounced, showing a much deeper disturbance of the air. Ordinary cyclones are very thin, only 2 or 3 miles deep, while hurricanes are certainly 5 or 6 miles deep. The anticyclonic and cyclonic areas are hardly to be considered as centers of motion except in the very lowest strata, since currents of air blow directly across them from west to east, even in the cumulus region of the Rocky Mountain districts. It is shown that remarkably long streams of air, as from the North Pacific to the Lake region, and from the Gulf of Mexico to the Lake region, counterflow against each other to form the cyclonic circulations. We can not consider these to be due to vertical convections drawing in these distant masses of air by indraft, since the vertical component ceases at 2 or 3 miles high. Rather the great horizontal convections of the lower strata, caused by the interchange of air between the polar and the tropic zones, produce counter currents at the cyclone centers, which develop vortices discharging upward into the permanent eastward drift. The study of these normal charts of circulation will tend to correct some prevailing erroneous conceptions regarding the structure of cyclones. It will surprise many to see that a strong and warm current in the cumulus region blows directly from the Pacific Ocean eastward across a cold-wave area, showing that cold waves are thin masses of air, hardly one mile thick, produced by surface radiation on the eastern or lee side of the mountains. It is no less remarkable to find that the centers of the high areas formed by the isobars drawn from reductions made by the Hazen method, now employed by the Weather Bureau, are often 500 miles distant from that indicated by the vectors of motion. The discrepancy between gradients and wind directions in the mountain districts is already well known, but the problem acquires a special interest from the study of these new charts.

The discussion of the nephoscope observations was very laborious in consequence of the necessity of handling the large mass of figures several times. For this purpose, the area surrounding a center of motion was subdivided into 20 parts, symmetrically disposed on three circles about the center, so that the transference from rectangular to cylindrical coordinates should be simple. The right-hand (anticlockwise) rotation, with positive direction "as the arrow flies," was also adopted. Each observation was located in the proper subarea according to its own district; each cloud type, at a given mean height, was computed separately; the northern districts were compiled by themselves and the southern by themselves; mean resultants for the vectors were found for each subarea in 8 levels, and charts of the circulation were constructed by accurately plotting in these vectors. The result shows that a slightly sinuous eastward movement prevails over the high and low areas in the cirrus stratum, gradually deepening as the surface is approached, till in the strato-cumulus the gyratory movement is very marked, and in the cumulus, stratus and wind levels predominant. The actual velocities diminish from 40 meters per second in the cirrus to 5 or 6 meters per second at the surface. Next, on the theory that the sinuous motion is due to components in composition, the mean rectangular *N-S* and *W-E* components were found by subtracting the means from them, and the residuals were combined in a secondary system of vectors, which were also transferred to charts. These are the true local gyratory vectors as distinguished from the general motions on the hemisphere. In the cyclone they show an inward radial component from the *bottom to the top*, and nothing outward in the upper strata, as Ferrel's circulation requires. They do not show a maximum velocity at a certain distance from the center with falling off nearer it, as Oberbeck's solution demands, but they increase from the outside up to the center. The components are strongest in the strato-cumulus region and diminish above and below; they show a continuous inflow everywhere together with a strong rotation about the center, such as to cause a true vortex with discharge upward throughout, the forced upflow being injected into the eastward drift which carries it off, while at the same time the flow is somewhat deflected anticlockwise. In the anticyclone on the two outer circles 750 and 1,250 kilometer radius, there is outflow from top to bottom on all sides; near the center there is inflow at the top, reversal at the middle, and outflow at the bottom, thus causing reversal of gradients in the in-

terior of the anticyclone. The entire system of high and low areas seems to be constructed by the counterflow, chiefly in the cumulus and strato-cumulus levels, of long currents, due to horizontal convection, the double action on the pressure—that is, the formation of high and low pressures simultaneously in adjacent districts—being referred to the general circulation of the atmosphere, especially the deflecting and centrifugal forces, rather than to local temperature accumulations. The North American Continent is the region where cyclones *form* in large numbers, and Europe-Asia the region where they *dissipate*, so that the violent general circulation over the United States in the lower strata, as compared to that of Europe, is chiefly responsible for this excess in the production, near or in the United States, of the local storms of the Northern Hemisphere.

A careful study of these vectors in all strata up to 11,000 meters, 7 miles high, reveals the very important fact that there is little disposition to conform to the canal theory of the circulation over the hemisphere, as ordinarily taught, namely, consisting of a southward movement in the lower strata from the polar zone toward the tropics, with reversal of the component from east to west at latitude 35°, together with an overflow northward in the higher strata from the tropics toward the poles. While the general circulation conforms to this type in many features, there has always been the greatest difficulty in accounting for the comparatively slow eastward drift in the upper strata of the higher latitudes. Ferrel attributed a large part of the required retardation to the effect of friction, but this is in reality a comparatively small term. Also, he stated that the difference in the eastward velocity of the northward and southward moving strata at different elevations represented the expenditure of retardational energy. As a matter of fact, the lower strata do not move southward *as a whole*, and our observations do not indicate that the higher strata are vigorously moving northward, because that component is very small. What takes place is this: In each stratum from the surface to the cirrus level about as much air moves north as south, for there are enormous counter currents *passing by each other at the same level, and not over one another at different elevations*. This puts a new aspect on the entire problem of the general circulation. It looks as if the solar radient energy was absorbed chiefly in the lower strata, and that, instead of going the rounds, overflowing above from the tropics, there is developed a continuous leakage in the lower strata, which is observed as our persistent winds from the south. These meet the north winds, which flow in obedience to the general circulation, as figured by the form of the land and ocean areas. This escape from the tropical belt diminishes the pressure in low latitudes, which would require to be balanced by an excessively rapid eastward drift. Furthermore, the formation of cyclonic vortices discharging into the eastward drift and distorting it also retards the eastward velocity. It is along these lines that a more probable explanation of the existing moderate eastward motion may be found than in Ferrel's theory, which has been widely accepted by students.

There is a chapter treating of the barometric diurnal wave and its relation to the magnetic diurnal vectors, as developed in Bulletin No. 21, 1898, together with a comparison of the diurnal components of the motion of the atmosphere locally, which shows some interesting relations. I have been unable, in the time at my disposal, to utilize the new general tables of motion in connection with the vectors just described. Something has been done in the way of a theory of the local cyclone and the tornado, which is promising, though its completion must be postponed to a future day. I have been most efficiently assisted in this work by the faithful labors of Messrs. H. H. Kimball, H. L. Heiskell, and R. H. Dean, who have taken great interest in the observations and the computations. The Chief of the Weather Bureau has always placed at our disposal all the resources of the office, and the other officials have uniformly rendered all the aid in their power.

NOTES BY THE EDITOR.

WIRELESS TELEGRAPHY.

We copy the following from Nature, February 8, 1900, p. 350:

In his lecture at the Royal Institution on Friday last, Mr. Marconi made a statement as to the use of his system of wireless telegraphy in connection with the war. He is reported by the Times to have said that six of his assistants were sent out to South Africa. The war office intended that the wireless telegraphy should only be used at the base and on the railways; but the officers on the spot, realizing it could only be of practical use at the front, asked if the assistants were willing to go to the front, and accordingly on December 11 they moved up to De Aar. The results at first were not altogether satisfactory, owing to the want of poles, kites, or balloons, which are needed to elevate the vertical wires; but the difficulty was overcome by the manufacture of kites, in which work Major Baden-Powell and Captain Kennedy, R. E., took part. It has been reported that the difficulty was due to the iron in the hills, but, as a matter of fact, iron has no more destructive effect on these Hertzian waves than any other metal, and Mr. Marconi has been able to transmit messages across the high buildings of New York, the upper stories of which are iron. However, when kites were provided it was easy to communicate from De Aar to Orange River, some 70 miles, and now there are stations at Modder River, Enslin, Belmont, Orange River, and De Aar. Two of the assistants volunteered to take instruments through the Boer lines to Kimberley, but the military authorities would not grant them permission, as probably too great risk was involved. It seemed to Mr. Marconi regrettable that installations were not established in Ladysmith, Mafeking, and Kimberley before the commencement of hostilities, but he found it hard to believe that the Boers had any workable instruments. Some intended for them, which were seized at Cape Town, were of German manufacture, and not workable, and Mr. Marconi said that as he had supplied no apparatus to any one, the Boers could not possibly have any of his instruments. In conclusion, he said he did not like to dwell on what might be done in the immediate or distant future. But he was sure that the progress made this year would greatly surpass what had been accomplished during the past twelve months, and, speaking what he believed to be sober sense, he said that by means of wireless telegraphy telegrams would become as common and as much in daily use on the sea as they are at present on the land.

LIGHTNING RODS.

There appears to be an unusual interest in the matter of lightning rods and the protection of buildings from injury by lightning. Much of this activity is traceable to the efforts of several enterprising manufacturers of lightning rods. One such company extends a general invitation to a certain Weather Bureau observer to "arrange to deliver lectures on electricity at a series of places in the State," and adds—

We will attend to having the matter announced and the time fixed and notify you of the same. We don't ask that this lecture should be in our interest, or that of any other manufacturer, but want the subject of electricity better understood, and then the people will protect their homes in some way and we will take our chances in the business with the others.

Although the Weather Bureau observer might not say a word about the rods manufactured by this company, yet, its enterprise in getting up this series of lectures would, undoubtedly, be heralded far and wide, and lead the Weather Bureau into undesirable complications. The observer did wisely to decline the request.

On the other hand, similar requests have, and may again,

come from the fire and life insurance companies. These have nothing to gain by the manufacture and sale of lightning rods but, in common with the people themselves, do wish to know the best method of protecting life and property. Under their auspices, Weather Bureau observers can, in most cases, safely arrange for public lectures on lightning without involving the Weather Bureau in any objectionable relations.

The question as to whether it pays to protect buildings, and if so, which forms of protection are the best, are matters that can not be decided except by a careful study of local statistics. A few experiments in a laboratory, or on a given building, can not safely be made the basis of an argument because the varied locations of buildings with reference to underground strata, hills and valleys, trees, and water courses or lakes, have a very important influence, to say nothing of the character of the building itself. Any Weather Bureau observer who contemplates lecturing on this subject should make a special study of the region within 10 miles of the lecture room, so that his audience will be able to apply what he says to their own local and individual needs. Such a discussion will also undoubtedly be a contribution to the subject proper for publication in the MONTHLY WEATHER REVIEW.

A KITE AND BALLOON STATION NEAR BERLIN, GERMANY.

The Berlin correspondent of the Standard announces that the Royal Prussian Meteorological Institute in Berlin is about to make arrangements for the systematic examination of the higher strata of the atmosphere by means of special apparatus. In the grounds of the Aeronautical Observatory at Tegel—a suburb of Berlin, where Alexander and William von Humboldt were buried—registrations of the atmospheric conditions at a height of three to five thousand meters will be carried on, if possible, day and night with kites and kite-balloons. The registering apparatus, which automatically records the pressure, temperature, humidity, and wind velocity at these heights, is taken up by a kite-balloon connected with the earth by piano wire. An elevation of 4,500 meters has been attained by a train of kites even without balloons when there was sufficient wind.—*Nature, February* 8, 1900.

SOUTH AFRICAN METEOROLOGY.

The study of climatology in Africa has been diligently prosecuted for many years past within the regions that are respectively presided over by England, Germany, France, Belgium, and Portugal. A complete review of the work done by Belgium is published on pages 481–878 of the second volume of the reports submitted to the National Congress of Hygiene and Medical Climatology for Belgium and the Congo. The congress was held at Brussels in August, 1897, and the volume in question was published about a year later. It gives reports from about 190 stations in the basin of the Congo, and has very properly been designated as an unequalled collection of data relative to Central Africa. The preceding part of the volume is devoted to medical climatology, properly so called, and gives much additional data relative to temperature, moisture, rainfall, cloudiness, and sunshine. The daily records of the bright and black bulb at the station Banana, are in fact, printed in full for nearly two years, July, 1893–March, 1895.

Important reports of the work done under English auspices in South Africa, are published annually by the Meteorological Commission of Cape Colony. A general summary of the rainfall records with excellent monthly maps of rainfall was published by the Commission in 1897, as compiled by Alexander Buchan. The last annual report, viz, that for the year 1898, has just been received and gives us the latest details with regard to the organization of the service. The stations that report to the Commission are as follows:

(*a.*) First order stations	1
(*b.*) Subsidiary first order	1
(*c.*) Barometric or second order stations	54
(*d.*) Thermometric or climatological stations	17
(*e.*) Special rainfall stations	370
(*f.*) Evaporation stations	7
Total	450

Over 50 of these were started during the year 1898, and therefore, have incomplete records for that year.

Of these stations 58 are located outside Cape Colony and Bechuanaland, viz:

Basutoland	8
Orange Free State	12
South African Republic	18
German Southwest Africa	10
Zululand	6
Rhodesia	2
Swaziland	1
Natal	1
Total	58

As the remaining 392 stations are, therefore, in Cape Colony proper, this serves to show how active the English have been in the matter of climatological records. A rather large proportion of these stations, however, are south of latitude 31°, leaving us still too much in the dark as to the rainfall over the western half of Cape Colony. Students of physical geography will quickly recognize the fact that the Orange River, which runs due west along the twenty-ninth parallel, derives the greater part of its water from the rains that fall over the eastern and rainy mountainous portion of the Continent, just as is the case with the Congo River itself, a thousand miles further north. As the Orange River flows westward through a region of less than 10 inches annual rainfall, it has necessarily cut deep ravines in a country where there are no side streams but plenty of dry water courses that represent the accumulated actions of occasional showers and cloudbursts. From the study of these dry valleys and starved streams one can presumably restore the several climatic periods during which the Continent has risen with increase of rainfall, and then fallen with diminution of rainfall. The area of 40 inches annual rainfall which has moved further and further to the east, is now confined to a narrow coast belt 150 miles either side of Durban, while the region of 30 inches rainfall nearly covers all of Zululand, Natal, Basutoland, and the southern coast of Cape Colony.

The most noteworthy feature of the report for 1898 is the inclusion for the first time of returns from the well-equipped first-order station established by the De Beers Company at Kenilworth, near Kimberley. This meteorological observatory and nine associated rainfall stations distributed over the neighboring district are under the management of J. R. Sutton, Esq., B. A. The observatory is furnished with a Kew barograph, recording photographically, as also a battery, consisting of two sets of twelve each of Negretti and Zambra's patent reversing thermometers, with cylindrical bulbs, one set mounted for dry-bulb observations and the other for wet.

With regard to the accuracy of the temperature of the air, as given by the standard maximum and minimum thermometers inside of the Stevenson screen and by another pair within a much larger screen, Mr. Sutton prints a table of mean values for 1897, showing that the average tempera-

tures in the two screens are identical, but the range of temperature in the small screen is 1.7° larger; that is to say, its maximum temperatures are 0.9° too high and its minimum temperatures 0.9 too low. Consequently, the larger screen is adopted as the standard. It is a single-louvred wooden screen, whose dimensions are 8 by 8 by 8 feet. This is about the size of the double-louvred screen used by the Weather Bureau at Washington, D. C., in 1870–1881, but afterwards replaced, in 1885, by the single-louvred screen, 3 by 3 by 3 feet.

As climatological studies of different parts of the world are very much affected by differences in the exposure of instruments and the methods of treating their indications, we need only call attention to the fact that Mr. Sutton deduces the dew-points from the readings of the wet and dry bulb by the use of Glaisher's Greenwich factors, a process that seems to us inappropriate to his dry climate, and by which he must, necessarily, lose much of the accuracy attainable in consideration of the great care that he has taken to give his wet and dry bulbs the proper exposure and treatment. However, he expresses the hope that he will be able to make a series of comparative observations of the dew-point with a Dine's hygrometer. As this has already been done by many others, he will doubtless be led to the same results as they, for there can be no doubt but what the ventilated psychrometer, either whirled or aspirated, is the only instrument comparable with the dew-point apparatus for convenience and accuracy.

We are much interested to notice that Mr. Sutton's experience is not favorable to the minimum thermometer exposed on the grass. In fact, this has long since been discarded by physicists as a means of indicating the intensity of sunshine, and can have little or no definite relation to the temperature of the grass. If solar radiation is to be measured, either absolutely or relatively, one must use the dynamic, and not the static, method. It matters not whether we use a black bulb *in vacuo* or the pyrheliometer of Pouillet, or that of Crova, or Violle, or Angström, or Chwolson, in every case the details of the apparatus are no more important than the method of using it, which must always be by alternate shading and exposing of about one minute each, or even less, and reduction by the proper formula. The only apparent exception to this rule is the newest electric pyrheliometer of Angström, but this is really for comparative, not absolute measurements.

Mr. Sutton admirably sums up the relative merits of the Campbell-Stokes burning recorder and the Jordan photographic recorder as used for the purpose of continuous register of the simple clearness and cloudiness of the sky. It would seem that the honors are about equally divided, and we would suggest that Professor Marvin's thermometric sunshine recorder be set up beside the other two, in the dry hot climate of Kenilworth.

Hydraulic engineers will be glad to avail themselves of the observations by Mr. Sutton on the subject of evaporation and its relation to rainfall. He has 6 rain gages within an area of 400 square miles, and says that it frequently happens that an inch or more of rain falls at one station without any rain at the others. The actual rain that falls into the tank is given for every hour of the year, as also the monthly totals of evaporation. The record was kept continuously by the auxanometer, constructed by the Cambridge Scientific Instrument Company. Observations were also taken regularly with the Piche evaporometer and the Pickering evaporator.

The approximate location of the Kenilworth observatory is, longitude, 24° 27′ E.; latitude, 28° 42′ S.; altitude, about 3,950 feet.

FROST WORK IN SOUTH AFRICA.

Among the interesting notes relating to rare meteorological phenomena in South Africa, we quote the following from the Annual Report for 1898, page 136:

An interesting phenomenon, apparently rare in South Africa, was observed during August, 1896, at Qachas Nek, in Basutoland, and reported by the assistant commissioner, H. R. Cartwright, to whom I am indebted for the following particulars, as well as for photographs of the same. Mr. Cartwright writes:

"I inclose a photo of some Japanese privet bushes covered with ice caused by a hard frost combined with a mist on August 5 last. The hedge was 10 feet high naturally, but by the spade standing alongside you will note that the height is less than half that amount, owing to the weight of ice on the branches. The natives here say they have never seen such an occurrence before, though I seem to recollect it in England. Owing to the fog being very thick at the time I took the photo, it is not as clear as could be wished."

From his reply to a letter asking a number of questions on the subject, it appears that a smooth and transparent coating of ice, about three-fourths of an inch thick, was deposited only on the windward (southeast) side of trees, branches, posts, etc., but none on the ground. There was no fall of hail, sleet, or snow, either before or after the occurrence. No definite time could be given for its first appearance, but there was no icy deposit at dusk on the 5th. Fog prevailed all day on the 5th, all that night, and up to 6 p. m. on the 6th. The deposit was first seen at 8 a. m. on August 6, and it began to thaw and drop off about 10 a. m. The privet bush was not broken, owing to its pliant branches, but several blue gums in the garden had about 5 or 6 feet of their tops broken off. The station is situated on the Drakensberg watershed, at an elevation of 7,150 feet, and faces almost due north. The readings, taken at 8 a. m. on the 6th, were: Dry bulb, 33°; wet bulb, 33°; minimum, 31°; rainfall (most probably a deposit from the fog or mist), 0.05 inch. One photograph shows the tall, slender branches bent completely over, so that their tops are touching the ground, and the other shows the bush in its natural condition from about the same point of view, the heights of the branches in both cases being contrasted with a spade 3 feet in length.

This phenomenon is comparatively common along the hedgerows in England, but is seen in much exaggerated form at high mountain stations, such as those on Mont Blanc and Ben Nevis, where the deposit, called fog crystals, is frequently 18 inches to 2 feet thick. It seems to be due to the watery particles of a drifting fog or mist being solidified into ice on coming into contact with a solid body.

On mountain tops this frostwork is a very common phenomenon, both in Europe and in the United States. Abundant illustrations of its occurrence on Mount Washington and Pikes Peak were published in the early days of the Weather Bureau, and similar cases have since then been noted on the summits of Säntis, Ben Nevis, and other mountains that have been occupied by meteorological stations; but certainly no one expected a case of this kind in Africa, in latitude 29° south, even at an elevation of 7,000 feet. The explanation above given is that which has been generally accepted, viz, that the moisture in the atmosphere has already condensed by the lowering of temperature into invisible small particles of ice or, possibly, spherules of water at a temperature below freezing; these, striking against any obstacle, accumulate on the windward side far more than on the leeward.

PROF. HENRY ALLEN HAZEN.

On the evening of Monday, January 22, 1900, Prof. Henry Allen Hazen, while riding rapidly on his bicycle, hastening to his night work at the Weather Bureau, collided with a pedestrian, and was dashed to the ground. After lying unconscious for twenty-four hours, he expired on the 23d.

Professor Hazen was born January 12, 1849, in Sirur, India, about 100 miles east of Bombay, the son of Rev. Allen Hazen, a missionary of the Congregational Church. He came to this country when ten years old and was educated at St. Johnsbury, Vt., and at Dartmouth College, where he was graduated in 1871. After this he removed to New Haven, Conn., and for four years subsequent was assistant in meteorology and physics under Prof. Elias Loomis. He was also privately associated with the latter in meteorological researches, and the preparation of many of the Contributions to Meteorology, published by Professor Loomis, some of which bear evidence of the reflex influence of the pupil on the teacher.

In the spring of 1881, when the present writer first saw

Professor Hazen in New Haven, the latter showed such an earnest interest in meteorology as to justify recommending him to the position of computer in the study room, which was then being organized by Gen. W. B. Hazen, the Chief Signal Officer, for the purpose of developing the scientific work of the Bureau, as a necessary adjunct to its important practical work. After his entry, May, 1881, into the meteorological work of the Signal Service, Professor Hazen took a prominent part in this field. The works specially assigned to him, such as the deduction of altitudes by railroad levels, the study of the psychrometer, the proper exposure of thermometers, the study of thunderstorms, annual courses of lectures on meteorology, were by no means sufficient to absorb his energies, and we find him writing and publishing on other subjects, such as barometric hypsometry and the reduction to sea level, the testing of anemometers, the study of tornadoes and the theories of cyclones, atmospheric electricity, balloon ascensions, the influence of sun spots and the moon, the danger lines of river floods, the sky glows and the eruption of Krakatoa. His enthusiastic advocacy of the importance of the balloon to meteorology was very highly appreciated. His five ascensions (1886, June 24-25, 1887, June 17 and August 13, 1892, October 27), undoubtedly gave very accurate temperatures and humidities. After the death of General Hazen, and during the administration of General Greely, the computers of the study room became junior professors at a higher salary, and were assigned to official duties of a broader aspect. In the course of such duties, Professor Hazen frequently took his turn as forecast official (beginning with October, 1887), and as Editor of the MONTHLY WEATHER REVIEW (beginning with December, 1888), while also acting as assistant in the Records Division. In July, 1891, in accordance with the terms of the transfer to the Department of Agriculture, he was appointed one of the professors of meteorology in the Weather Bureau, where he was at once assigned to regular and congenial duties in the Forecast Division.

Having shown that the Hazen thermometer shelter was much better than the large, close double-louvered one formerly used, his form was adopted by the Weather Bureau, in 1885, and still remains in use. His experimental work with the sling psychrometer and dew-point apparatus was executed with great care and refinement, but his resulting psychrometer formula differs from those in current use, in that he rejected the important term depending on the barometric pressure. Among his larger publications were: The Reduction of Air Pressure to Sea Level and The Climate of Chicago.

Professor Hazen was a frequent contributor to meteorological and other scientific journals. He was one of the supporters of Science during the years 1882-1889, and of the American Meteorological Journal, 1884-1896. He also published independently his Meteorological Tables and The Tornado, and possibly other works. A complete list of his published writings would include several hundred titles.

It must be confessed that a peculiar temperament sometimes led him to beliefs and statements in scientific matters entirely untenable at the present day, but to which he adhered with such pertinacity that to some he occasionally appeared obstinate and headstrong. This was simply a result of the intense earnestness of his own convictions which so completely absorbed his mind that there was no place for further considerations. However, the amiability of his character always prevented any enduring unpleasant feeling between himself and his associates.

In addition to his work in meteorology, Professor Hazen, like his master, Professor Loomis, was greatly devoted to the study of family history and genealogy, and it is understood that his collections in that line are in proper shape for the publication of a large volume. Certainly the wide-spread family to which he belonged includes very many distinguished names in theology, literature, commerce, and military matters. A great tenacity of purpose, independence of character, boldness in the defence of personal convictions and energy of execution are prominent characteristics of all the families bearing the name of our departed colleague. Himself unmarried, he cared lovingly and dutifully for relatives who depended on him. His heart was as many-sided as his intellect.

DEATH OF GEN. A. A. TILLO.

We regret to announce the death of Gen. A. A. Tillo at at St. Petersburg on January 11, 1900.[1]

General Tillo has, during the past twenty-five years, published numerous works, both large and small, on meteorological, magnetic, and other branches of terrestrial physics. We owe to him an extensive work on the distribution of atmospheric pressure over the entire Russian domain. He was vice president of the Russian Geographical Society, and his sudden death, at the age of 61, is a great loss to science.

WINTER KILLING OF FRUIT TREES.

In the November report of the Ohio section, Mr. J. Warren Smith communicates some of the replies to letters of inquiry sent out by him in order to collect statistics relative to the injury to fruit trees by cold winter weather. Mr. H. W. Gilbert, of Portage County, says:

I watched my peach trees pretty closely and did not discover any serious trouble until the cold spell in February. Then the cambium layer turned very brown and the wood was brown clear through and very brittle. The leaves, buds, and bark seemed bright, but the cambium was brown and grew darker all the way down until about a foot from the ground where the tree seemed to suffer the greatest damage. * * * I immediately cut 300 especially fine 3-year old trees off just above the snow line, leaving about 6 or 8 inches of bud wood that was apparently uninjured, thinking they would sprout, but they did not. * * * * I have just finished pulling up the roots and they are all bright, but not more than one-third had any sprouts on the roots.

In an orchard of 700 2-year old trees, I cut off about 100; they sprouted all right. The remainder of the orchard I cut back about the entire growth of the previous year and they have done finely; a few of the hardiest I left without trimming as an experiment, they look sickly and have made slender growth.

All trees that I have examined this fall have made but little new growth, but have deposited new wood of very uncommon thickness on the larger limbs and trunks, thus demonstrating that we can not determine by thickness of the layers of wood just how the trees have flourished during the year.

FARMERS' BULLETINS.

From a paragraph in the November report of the Mississippi section we infer that the Section Director, Mr. H. E. Wilkinson, has obtained from the Secretary of Agriculture a sufficient number of Farmers' Bulletin No. 89, On Cow Peas, to furnish a copy to each of the Weather Bureau crop correspondents and voluntary observers. This admirable arrangement is one that can be heartily recommended to all section directors. It is proper to add that if any section director can compile a short practical bulletin of from four to sixteen octavo pages on any subject of importance to the agriculturists of his State it will probably be acceptable to the Chief of the Weather Bureau and be recommended by him for publication as a farmers' bulletin.

[1] We assume that this is new style, as it has been widely stated that the new or European style of reckoning will be introduced, officially, into Russia during the present year.

THE SOIL AND THE CROPS.

In the October, November, and December numbers of the report for the North Dakota section, Mr. B. H. Bronson publishes some studies in meteorology by Prof. E. F. Ladd, from which we make the following compilation showing the mean temperature of the soil at the depth of 1 inch and 12 inches, the percentage of water in the first foot of soil during the months of the growing season, and finally the average yield per acre in bushels.

This table does not show any simple relation between soil and crop but stimulates further study of the subject.

Soil and crop at Agricultural College, North Dakota.

Year.	May.			June.			July.			August.			September			October.		
	Mean soil.			Mean soil.			Mean soil.			Mean soil.			Mean soil.			Mean soil.		
	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.	Temperature, 1 inch.	Temperature, 12 inches.	Moisture, per cent.
1892	48.3	39.4	35	66.5	53.9	30	75.0	62.6	28	72.4	64.0	30	65.5	58.0	28	51.6	51.8	19
1893	52.3	38.7	31	69.6	55.6	23	74.9	63.9	28	77.0	63.7	22	66.9	58.7	15	47.2	46.6	24
1894	58.1	47.2	28	71.5	60.1	18	72.4	65.3	17	75.0	64.8	10	69.8	58.1	12	42.0	47.8	27
1895	62.0	48.1	24	66.0	56.9	22	71.2	62.6	22	77.8	63.2	16	69.2	58.8	19	53.2	47.4	16
1896	59.5	47.6	30	65.1	57.3	25	75.9	63.1	12	76.5	63.2	17	60.1	55.7	26	46.8	46.5	12
1897	60.0	43.5	....	63.4	53.6	....	72.0	63.9	....	72.7	62.8	....	72.6	61.3	....	50.6	52.2	....
1898	56.5	43.0	....	67.4	56.4	....	77.0	63.9	....	78.1	63.4	....	65.5	58.3	....	46.2	47.7	....

Year.	Crop yield, bushels per acre.			
	Wheat.			Oats.
	Experiment plots.	Agricultural farm.	Cass County.	Agricultural farm.
1892	19.4	18.6	13.3	36.4
1893	9.1	13.7	9.8	34.6
1894	18.9	20.7	14.0	59.3
1895	23.4	31.4	18.9	50.4
1896	16.4	12.8	11.5	49.5
1897	13.2	10.5	10.5	39.8
1898	22.9	24.3	15.0	70.5

ERRORS IN SCHOOL BOOKS.

According to the November report of the Oregon section the following remarkable statement relative to the climate of Montana appears in the geography adopted by the legislature for the use of the public schools in that State.

"The warm winds known as the chinook winds, from the Pacific, heated by the Japan current, may spring up even in the coldest weather." A gentleman living in Montana writes as follows: "As the Japan current has about as much to do with the climate of Montana. * * * I think the time has arrived to obliterate these errors." Mr. B. S. Pague very properly adds: "The root of the evil is to be found in school text-books and in the ideas of the instructors."

In a recent pamphlet issued by Mr. Pague he has endeavored to educate the people to a more correct view of the dry chinook winds of Montana, which are certainly not due to the Kuroshiwo or Japan current, nor to any specific influence of the Pacific Ocean, but represent merely one of many cases in which descending air is warmed by compression.

In general, errors that have once been introduced into school text-books are very apt to stick there, and also in the minds of the scholars and give rise to a fine crop of other errors in future years. Not a day passes but what the Weather Bureau observers throughout the country have to answer a thousand questions suggested by erroneous views disseminated in the school books used in the childhood of the present generation. Even the best of publishers who sends his proof sheets to some Weather Bureau official for revision will occasionally hesitate to cut out a paragraph or alter an expression that seems to him likely to be popular and taking with the people. It is generally said that the text-book which is intended to be committed to memory must not contain anything above the comprehension or contrary to the views of the teacher, since the latter must always be ready to satisfactorily answer the questions of the more intelligent pupils. The teacher is always in a dilemma when he dares to question the text-book and must explain to the scholars, and especially to the school trustees, how he knows that the text-book is wrong. There is a halo around the author's name on the title page of the text-book. He is the authority and not the teacher. His book has been adopted by the State board or the local school board; it has a hundred complimentary letters from distinguished reviewers, and woe to the teacher who impugns its authority or correctness. The true remedy for it all is to insist that every author or publisher shall revise the text-book, no matter at how great an expense, and thus endeavor to keep it abreast with the progress of the times.

Some teachers adopt the rule that the text-book must be used as an authority for dates and facts, but that the author's explanations of the reasons why and his comments on matters of politics or finance may be wholly omitted and replaced by the better personal knowledge of the teacher. In scientific matters this is a safe rule, especially if the teacher is wise enough to point out those cases in which our knowledge is still so unsatisfactory that we are not justified in giving any authoritative explanation.

FRUIT PROTECTION IN FLORIDA.

In the November report of the Florida section, Mr. A. J. Mitchell, writes as follows:

No specious argument is necessary to show that the Florida fruit grower has an abiding faith in the future of orange culture. As a result of the severe freeze of last winter many ingenious devices have been evolved with a view to protecting fruit trees and pineapples. Some of these measures are of undoubted utility; the merits of others are, as yet, problematical. History proves that in every crisis the skill and intelligence of man have been such as to circumvent continued disaster. And so it is with fruit growing in portions of north-central Florida. Previous to 1895 there had been no occasion for considering extreme protective measures. The necessity of preparing for cold weather, however, has now taken such a firm hold upon our fruit growers that thousands of dollars were expended during the past summer with a view to affording ample safety to crops. It is certain that no farmer ever faced disaster with more fortitude than did the Florida horticulturist, and the severe test only stimulated his determination to overcome all difficulties.

A visit through the orange belt of the State would be a revelation to those who, previous to 1895, were familiar with groves developed under normal winter conditions. A suggestion at that time that orange culture would ever require "house protection" would have been regarded as the idle vaporings of the irresponsible. The measures usually adopted are such as to protect against the severest conditions, hence we find hundreds of acres completely inclosed and covered with cypress strips. Nearly all coverings are so arranged as to be readily removed or adjusted so as to admit the sunlight. There seems to be a diversity of opinion regarding the superiority of the shed inclosure as compared with the tent. In both cases provision is made for the use of lamps, one to each tree, or salamanders filled with coke. It is well to add here that these preparations are largely confined to north-central Florida, which, previous to 1895, was the orange belt of the State. In southern counties ordinary fires are regarded as sufficient to meet all exigencies. Many groves, some containing 35 acres, have been covered at a cost of $400 or $500 per acre. The interest manifested and

expense incurred show that citrus fruit growing will be rapidly restored to its former prestige.

When writing the above Mr. Mitchell could hardly have anticipated that the month of February, 1900, would have brought to Florida a freeze almost as severe as that of February, 1899. The morning reports for February 19 show a minimum of 28° at Jupiter, so that undoubtedly freezing weather prevailed from latitude 26° northward throughout the Peninsula. There certainly have been a number of severe freezes in Florida during the past six years, but we believe that the time will soon come when there will be a temporary let up on severe blizzards, but even if they should continue, there is no reason to doubt but what agriculture in Florida can be made profitable by the proper use of protective devices.

HISTORICAL EVENTS IN METEOROLOGY.

In the report of the New Mexico section for November, 1899, Mr. R. M. Harding gives an interesting list of historic cold winters, mostly in Europe. It would be a welcome contribution to American meteorology if our section directors and observers would overhaul files of newspapers, magazines, and ancient manuscript records, and also by conversation with the oldest inhabitants, collect the rapidly disappearing records of the weather in their respective States. At the close of Mr. Harding's list, he says:

In 1863-64 a severe cold wave swept over the whole of North America. The thermometer went to 60° below zero in the Northwest. The Mississippi River was blocked with ice in a single night, and in twelve hours froze from St. Paul, Minn., to Cairo, Ill.

IRRIGATION IN WINTER.

In the November report of the Arizona section Mr. W. G. Burns, Section Director, publishes a short article by Prof. A. J. McClatchie on the effect of winter irrigation of an orchard. Of course, the ordinary custom of the farmer is to delay irrigation until drought threatens the welfare of plants or crops. In the present case it was proposed to anticipate the light rains and droughts of the dry season by saturating the soil during the winter, or rainy season, when water is usually abundant. Professor McClatchie irrigated an isolated peach and apricot orchard by the furrow system eight times between December and March; the surface soil was cultivated twice when it became dry, and also plowed and harrowed once after the irrigation. The moisture content of the soil was determined by examining samples at each foot from the surface down to the ground water during April, May, June, and September, and by following the roots it was shown that the water, to a depth of 20 feet, was utilized by the trees. In general the roots passed downward through 10 feet of gravel and 4 feet of clay. The samples indicated that the irrigating water penetrated to a depth of 24 feet. The moisture increased down to the 16th foot, then it diminished to the 26th foot, then increased again until ground water was reached at 34 feet. A second set of samples, taken in May, showed that the capillary action upward had about kept pace with the evaporation. The third set of samples, taken in June, showed that the upper 5 feet had become quite dry, but there was still plenty of water within reach of the deeper roots. The fourth samples, taken in September, showed that the upper 15 feet were comparatively dry, but the lower extremities of the roots were still surrounded by the moist soil. The trees grew thriftily, were well loaded with fruit of excellent quality, and at the close of the season were in fine condition, although they had received but one irrigation since March.

The general result of this experiment shows the importance of irrigating very early and, in fact, throughout the winter, thereby dispensing with the labor of irrigation during the summer and utilizing to the utmost the winter rain and melted snow in the arid region of the United States.

THE WEATHER BUREAU AND COMMERCE ON THE GREAT LAKES.

In the December report of the Michigan section, Mr. C. F. Schneider, Section Director, gives a number of items relative to the navigation of the Great Lakes during 1898 and 1899, from which we take the following:

Number of vessels, 20,255; number of passages during the season, through the Detroit River, either way, 22,741; number of passengers, 49,082; bushels of wheat, 58,397,355; barrels of flour, 7,114 147; tons of iron ore, 15,328,240; feet of lumber, board measure, 1,038,077,000. There are about as many clearances of vessels at lake ports as there are from all the seaports of the United States combined.

The Weather Bureau furnished the masses of vessels passing Detroit 16,200 weather maps and 22,500 weather forecasts, storm warnings and special afternoon reports of the wind. No vessel of importance passes Detroit without getting its weather map and forecasts.

The astonishing importance of the commerce of the Great Lakes depends partly upon the fact that so many vessels leave the lake ports directly for Europe and Asia. During the nine months of the year when the Sault Ste. Marie Ship Canal is open to navigation two and a half times as much tonnage passes through it as passes the Suez Canal during the entire twelve months. The registered tonnage passing Detroit during the nine months is more than that of New York, London, and Liverpool combined. The fact that the merchandise is largely wheat, flour, iron, and lumber, instead of silks and teas and manufactures of all kinds, does not in the least diminish its importance or the responsibility of the Weather Bureau in regard to this commerce.

MIRAGE.

In the January report of the South Dakota section, Mr. S. W. Glenn, Section Director, says:

The observer at Desmet reports an unusually strong mirage in that vicinity on December 21, 1899. The town lies just north of a considerable rise in the prairie, which shuts it from view to persons approaching from the south. The observer says: "To persons south of the town the hills appeared to vanish and Desmet could be plainly seen, apparently up in the air."

THE HIGH STATIONS OF WYOMING.

The November report of the Wyoming section contains a chart showing graphically the monthly precipitation at Cheyenne from 1871 to 1899, inclusive, in which the large percentage during the months of April, May, June, July, and occasionally August, stand out very prominently. Cheyenne has always been considered one of the high stations of the Weather Bureau service. For a long time it and Mount Washington were our only important high stations. Although Cheyenne is but a little lower than Mount Washington, yet it is essentially on a plain or high plateau and not a mountain top. The November report shows that Wyoming has 5 stations betweeen 4,000 and 5,000 feet; 7 stations between 5,000 and 6,000 feet; 10 stations between 6,000 and 7,000 feet; one between 7,000 and 8,000, and 2 between 8,000 and 9,000, with 6 other stations whose elevations are not given in this number of the report, although doubtless they could be estimated accurately to within 100 feet.

The climate of a high plateau offers many interesting peculiarities. Both the diurnal and the annual variations of the various meteorological elements differ entirely from those in the plains near sea level. The fact that the high land is in the interior of a large continent adds another important con-

dition affecting the climate. A plateau of the same height and latitude closely surrounded by an ocean would have a very moist and cloudy climate, and if a little higher up would be covered with snow and glaciers. The conditions that favor the formation of glaciers or permanent fields of snow on such a large scale as once prevailed in eastern North America, can be elucidated by the comparison of the Wyoming plateau with surrounding lowlands. Mr. W. S. Palmer, Section Director for Wyoming, has added to his tables a number of stations outside of the State, and, perhaps, a few more would bring out the general climatological relations that we have in mind.

NEW METEOROLOGICAL TERMS.

Occasionally a word that is new to the Editor is found in the reports of our observers, or in the newspaper and popular literature of the day. Past experience shows that these words may, many years hence, crop up again as proper meteorological terms in use over wide areas. Much labor has been spent in hunting up the origin of the word "blizzard," and we shall probably do a favor to a future generation of historians, if we make a permanent record of these words which are, at present, in very local usage only.

In the January report of the Tennessee section, Mr. H. C. Bate, Section Director, publishes the report of the voluntary observer at Grace, Tenn., to the effect that "the first day of the year is a very cold one; a small 'skift' of snow fell and there was a very cold north wind."

We hope to receive the exact definition and usage of this word "skift."

WINTER THUNDERSTORMS IN MISSISSIPPI.

In the January report of the Mississippi Section, Mr. H. E. Wilkinson, Section Director, states:

Thunderstorms in midwinter are not unknown in the lower Mississippi Valley, but it seldom happend that such an electric disturbance as that of December 10, 1899, occurs, even in summer. During the past ten years nine thunderstorms have been recorded at Vicksburg during the month of December; in some cases two in one month, and in three cases none during the month. The records for twenty-nine years show but eight cases where over 5 inches of rain fell in twenty-four hours and but four cases where the rain was heavier than on December 10. At Vicksburg on this date the thunder and lightning held sway throughout the day and into the night. The morning chart of December 9 showed a moderate depression central over Oklahoma and central Kansas. At 8 p. m. of the 9th this had spread over a large area from Iowa to Texas. By 8 p. m. of Sunday, the 10th, the depression had contracted in area and increased in depth until the barometer reached 29.58 at Little Rock, Ark. At Vicksburg heavy rain fell from early in the morning of the 10th, without intermission, throughout the day, accompanied at times by vivid lightning and terrific thunder. The climax was reached by 5 p. m. The line of 8 inches of rainfall or more was confined to the southwestern counties of the State, the major portion falling between 10 a. m. and 10 p. m. Sunday.

SNOWFALL IN THE ROCKY MOUNTAINS.

In the January report of the Colorado section Mr. F. H. Brandenburg, Local Forecast Official and Section Director, gives his usual summary of the snowfall in the mountains. When these reports have been accumulated for a few years, they will form an invaluable fund of data for the investigation of the laws controlling not only the fall but especially the accumulation of snow in the formation of glaciers. Warm rains, warm sunshine, and dry winds eat up the snow that falls in Colorado so that glaciers are scarcely possible under existing conditions. A slight modification of these conditions made immense glaciers possible in the Rocky Mountain region, and especially in the Lake region and the northern Appalachians during the glacial epoch of geology. Mr. Brandenburg reports that at the close of the current January the depth of snow was only from one-third to one-half as much as at the end of January, 1899, for stations between 7,500 and 10,000 feet, but that for stations in the vicinity of timber line the ratio ranges from one-third to two-thirds. Among the reports of deep snows lying on the ground at the end of the month at timber line we quote the following:

	Inches.
Arkansas watershed:	
Colddale, Fremont County	72
Menger, Las Animas County	[1]72
South Platte watershed:	
Bailey, Park County	36
Jefferson, Park County	36
Rio Grande watershed:	
Wagon Wheel Gap, Mineral County	36
Alder, Saguache County	36
Gunnison watershed:	
Iola, Gunnison County	48
White Pine, Gunnison County	40
Grand watershed:	
Ivanhoe, Pitkin County	60
Watson, Pitkin County	[1]72
Crystal, Gunnison County	84

In the January report of the Idaho section, Mr. S. M. Blandford, Section Director, gives some statistics relative to snow, from which we copy the following:

In general the snowfall is decidedly deficient; it is only in the mountains of Bear Lake and Oneida counties, in the southeastern corner of the State, that the snowfall has approached the average. For comparison with the data in Colorado we copy the following from among the larger figures giving the depth of snow on the ground at the end of the month at timber line:

	Inches.
Snake River watershed:	
Parker, Fremont County	13
Wilfard, Fremont County	26
Bear River and Lake drainage:	
Liberty, Bear Lake County	18
Ovid, Bear Lake County	30
Wood River watershed:	
Corral, Blaine County	24
Boise Basin:	
Atlanta, Elmore County	14

It is evident that there is danger of a deficiency of water in the rivers during the coming spring and summer.

THE RELATION OF TEMPERATURE TO COLOR.

It is quite a common fallacy to say that the darker colors are warmer, whether we speak of clothing or soils. But it is far more proper to say that the darker color is due to the texture and other qualities of the cloth or soil, and that these other qualities (not the color itself) cause the differences as to warmth. In the January report of the Virginia section, Mr. E. A. Evans, Section Director, illustrates this point by a quotation from Johnson's work How Crops Feed, as follows:

"The observations of Malaguti and Durocher prove that the peculiar temperature of the soil is not always so closely related to color as to other qualities. They studied the thermometric characters of the following soils, viz: Garden earth of dark, gray color (a mixture of sand and gravel, with about 5 per cent of humus); a grayish-white quartz sand; a grayish-brown granite sand; a fine light gray clay (pipe clay); a yellow sandy clay; and finally, four lime soils of different physical qualities.

It was found that when the exposure was alike, the dark gray granite sand became the warmest, and next to this the grayish-white quartz sand. The latter, notwithstanding its lighter color, often acquired a higher temperature at a depth of four inches than the former, a fact to be ascribed to its better conducting power. *The black soils never became so warm as the two just mentioned.* After the black soils, the others

[1] On northern slopes.

came in the following order: Garden soil; yellow sandy clay; pipe clay; lime soils having crystalline grains; and lastly, a pulverulent chalk soil."

At noon of a July day when the temperature of the air was 90°, a thermometer placed a little more than 1 inch below the surface of different soils gave the following results:

	Degrees.
In quartz sand	126
In crystalline lime soil	115
In garden soil	114
In yellow sandy clay	100
In pipe clay	94
In chalk soil	87

It would seem that the warmest soils are those that retain the least water, and doubtless something of the slowness with which the fine soils increase in warmth is connected with the fact that they retain much water which in evaporating appropriates and renders latent a large quantity of heat.

METEOROLOGICAL CONGRESS AT PARIS, SEPTEMBER 10-16, 1900.

In addition to the important official international conferences that are occasionally called together by the Permanent International Committee, there are other nonofficial congresses that may be assembled at any time. Such were held at Paris, France, in 1887, and at Chicago, Ill., in 1893. The Chief of the Weather Bureau has just received a circular letter notifying him that the authorities of the exposition at Paris have called an international meteorological congress to be held from the 10th to the 16th of September, 1900, and he has been requested to distribute certain circulars of invitation to those interested in the subject.

We print herewith the translation of the body of the circular, but omit the provisional program of subjects that may be discussed.

Those of our observers, either voluntary or regular, or other of our correspondents who desire to attend this conference, or who desire to simply become members and to receive the volume of proceedings that will eventually be published, should make application to M. Angot, General Secretary of the Committee of Organization, Avenue de l'Alma, No. 12. Money orders for the necessary 20 francs should be made payable to Th. Moureaux, Treasurer of the Congress. They should also in making their application be particular to write their names in full and very distinctly, with their titles and positions and home address, and the titles of communications, if any, that they propose to send in. The forms appropriate to such applications may be obtained from the Editor of the MONTHLY WEATHER REVIEW.

The following is the circular letter above referred to:

REPUBLIC OF FRANCE. MINISTRY OF COMMERCE, INDUSTRY, POSTS, AND TELEGRAPHS. EXPOSITION OF 1900. OFFICE OF THE GENERAL COMMITTEE OF ARRANGEMENTS. INTERNATIONAL CONGRESSES. INTERNATIONAL METEOROLOGICAL CONGRESS. PARIS, SEPTEMBER 10-16, 1900.

SIR: An international congress of meteorology will take place at Paris from September 10 to 16, 1900. We hope that you will be pleased to give it your membership and cooperation.

The International Meteorological Committee, which met recently at St. Petersburg, decided that it would call a meeting of the different committees established by the conference at Paris in 1896, at the same time with the present congress.

These committees are as follows:

Terrestrial magnetism and atmospheric electricity.—President, M. Rücker.

Aeronautics.—President, M. Hergesell.

Study of the clouds.—President, M. Hildebrandsson.

Radiation and insolation.—President, M. Violle.

The first of these committees held an important meeting at Bristol in 1898, an account of which, and the resolutions adopted by it, have been published in the Report of the British Association for the Advancement of Science.

Again, a large number of ascensions, with manned balloons and sounding balloons have been made in various countries for the systematic study of the upper regions of the atmosphere.

Finally, the publication and the discussion of the international observations of clouds made in 1896-97 will probably be accomplished during 1900 for the greater part of the countries that took part therein.

From these various points of view we are justified in counting on communications of the highest interest.

The questions that the congress will be called upon to discuss are not restricted, however, to meteorology so-called; they include, in general, everything that concerns the physics of the globe.

It seems to us that it would be premature, at the present moment, to prepare a detailed program of these different questions, and that it must suffice to have indicated its general character by the accompanying provisional program.

In order to facilitate the publication of the definitive program, we beg that you will kindly send, as soon as possible, and certainly before the 15th of May, 1900, your adhesion to this congress and indicate the questions that you intend to bring up for discussion.

The sessions of the congress and of the committees will be held at the hotel of the Société d'Encouragement, rue de Rennes, No. 44, the same place where the International Conference of 1896 held its meetings.

The price of the subscription is fixed at 20 francs (about $4). The payment of this sum will confer the right to a card of admission and to the volume containing the proceedings of the sessions, as well as the memoirs presented to the congress. We hope that this publication will prove to be of great interest to all meteorologists.

Acceptance of membership and communications relative to the organization or to the program of the congress should be addressed to M. Angot, Secretary-General, Avenue de l'Alma, No. 12, Paris.

Subscriptions may be sent by post office order to M. Moureaux, Treasurer, rue de l'Université, No. 176, Paris.

(Signed) E. MASCART,
President of the Committee on Organization.

A. ANGOT,
Secretary General.

METEOROLOGY AT THE PARIS EXPOSITION.

Early in March Prof. C. F. Marvin, Dr. O. L. Fassig, and Mr. E. G. Johnson, will be ready to sail for Paris in order to establish and take charge of the meteorological exhibit of the Weather Bureau at the Exposition of 1900. This exhibit will be in a special building occupied by the United States Weather Bureau and the United States Post Office Department, and will be located on the Quai d'Orsay on the Seine, north of the Eifel Tower. The post office address will be care of the office of the United States Commissioner, 20 Avenue Rapp, Paris, France.

The representatives of the Bureau have promised to communicate to the Editor occasional notes on matters of meteorological interest, and voluntary observers who visit the Exposition are all invited to cooperate.

In addition to the work at the Exposition it is hoped that Professor Marvin will have an opportunity to make a series of international barometric comparisons, so that the standards used by the Weather Bureau may continue to be in close accord with those recognized by the Permanent International Committee. The important work already described in the MONTHLY WEATHER REVIEW as being done with sounding balloons, not only at Trappes, near Paris, but also at Berlin, Strasburg, St. Petersburg, and elsewhere, will undoubtedly also be specially studied by him if in any way possible consistently with his other duties.

It is interesting to note that apparatus devised for the use of the United States Weather Bureau is being imitated in Europe, and possibly Professor Marvin may find his own devices as made by others on exhibition at Paris.

LECTURES IN THE SCHOOLS.

Mr. E. C. Vose, Section Director, West Virginia, recently gave a talk on meteorology before the senior class of the high

school at Parkersburg. The talk was illustrated with a series of maps showing the origin and movement of the recent severe storm that passed from one end of the country to the other, and caused such a decided fall in the temperature. It was a practical talk, and gave much information upon a subject of universal interest.

Mr. A. F. Sims, Forecast Official, gave a lecture on January 20 before the normal school at Cooperstown, N. Y., in continuation of his extensive system of lecturing at all points easily accessible from Albany.

Mr. Maurice Connell, Observer Weather Bureau at Red Bluff, Cal., gave a talk on physical geography and the weather to the pupils of the high school at that place on January 15. He pointed out the causes that affect the climate of California, and explained the Weather Bureau system of symbols and forecasts.

LONG DRY SPELLS.

In the November number of the report of the Colorado section Mr. F. H. Brandenburg publishes an excellent piece of work, viz, a list of all dry periods of twenty days or longer, arranged by seasons, based, of course, entirely upon the records of the Denver station from November, 1871, to December, 1899, inclusive. He counts as a dry spell one in which nothing more than 0.01 inch of rain falls. Thirty-five such spells, of from twenty to forty-six days' duration, are enumerated during the fall months, from August to December; twenty-one cases, of from twenty to fifty-eight days each, during the winter months, from November to February; ten cases, of from twenty to twenty-eight days each, during the spring months, from February to May, and, finally, five cases, of from twenty-four to fifty days each, during the summer months, from May to September.

Since the distribution of barometric pressure, which brings about dry weather, is generally widespread, therefore these dry spells often prevail simultaneously over extensive areas.

In order to show that these long dry spells follow a law of distribution that agrees with the laws of probability or chance, the Editor submits the following enumeration:

Length of spell.	Number of cases.	Length of spell.	Number of cases.	Length of spell.	Number of cases.	Length of spell.	Number of cases.
Days.		*Days.*		*Days.*		*Days.*	
20	10	28	2	36	0	44	0
21	12	29	0	37	2	45	0
22	8	30	1	38	0	46	1
23	5	31	1	39	1	47	0
24	5	32	4	40	1	48	0
25	8	33	3	41	0	49	0
26	1	34	2	42	1	50	1
27	2	35	0	43	1	58	1
Total	......	......	......	......	......	......	71

We can not too strongly recommend all observers to compile similar tables, as illustrative of the peculiarities of the local climate. It would also be well to show, not merely these absolutely dry spells, but, also, those in which a very small quantity of water falls. For instance, if at a given station the water supply for the use of a city runs dangerously short when twenty days go by without more than 1 inch of rainfall, it would, therefore, be important to know the number and lengths of intervals having 1 inch of rain. In another case, if the river attains an undesirable height and interferes with business when there has been 10 inches of rain within five days, therefore a record of the intervals within which 10 inches of rain have fallen becomes interesting.

LECTURES AT FARMERS' INSTITUTES.

Mr. E. W. McGann, Section Director, New Brunswick, N. J., writes to the Editor as follows:

I have about completed arrangements with the Secretary of the State Board of Agriculture for a series of addresses to be delivered during the next fall and winter at the Farmers' Institutes held in each county of the State. The themes will be about as follows: What the United States Weather Bureau and the State Service have done, and are doing for the farmers; the principal features of the weather in the vicinity of each Institute; dry and wet seasons; fluctuations in temperature and rainfall, etc. A set of instruments will be on exhibition and fully explained at each Institute, as the Chief has promised me that assistance. * * * I think such a plan will bring the Service closer home to the people, especially the farmers, as very few of them have any idea of the magnitude of the work performed by the National Bureau.

Mr. S. S. Bassler, Local Forecast Official at Cincinnati, Ohio, delivered a talk on Weather Bureau matters to the Farmers' Institute which assembled at Blue Ash, Ohio, on Saturday afternoon, January 6. His address was well received.

CLIMATOLOGY OF SAN DIEGO, CAL.

In the November and December numbers of the California Section Mr. A. G. McAdie, Forecast Official and Section Director, publishes an extensive article by Ford A. Carpenter, Weather Bureau Observer, on the climatology of San Diego. The tables are too elaborate and extensive to be republished in the MONTHLY WEATHER REVIEW, but would make an admirable basis for a monograph or bulletin. The discussion begins with the records for July, 1849, as kept by the United States Army post surgeons, including those kept by the United States Coast Survey and the United States Signal Service, and thus gives a continuous record for fifty years. Owing to the great importance of the question of droughts and the fact that so many persons in southern California have appealed to the Weather Bureau to encourage artificial rain making, the Editor has made the following computation, based upon Mr. Carpenter's table of monthly precipitation after completing the table for the whole of 1899:

Monthly rainfall.

Months.	Number of cases having—				Total monthly (inches).
	0.00-0.10 inches.	0.11-0.50 inches.	0.51-2.00 inches.	2.00 or more inches.	
January	5	3	25	17	1.75
February	3	8	23	16	1.88
March	5	10	28	7	1.37
April	8	21	17	4	0.64
May	21	20	7	2	0.33
June	42	7	1	0	0.07
July	44	4	2	0	0.05
August	40	8	2	0	0.11
September	45	3	2	0	0.08
October	23	16	9	2	0.33
November	9	12	19	10	0.95
December	0	10	24	16	1.97
Total	245	122	159	74	9.58

It appears from this table that the rainfall for November, December, January, February, and March generally comes in showers sufficient for vegetation. During April, May, and October the rains are light showers that may be helpful to vegetation. During June, July, August, and September the showers are too light and infrequent to maintain vegetable life. If plants flourish during these months it must be by virtue of the water stored up in the soil. The rainy season is considered to include the eight months from October to May, inclusive. The following four months constitute the dry season of the agricultural year. The success of the crops

depends essentially on the rainfall of the wet season combined with the power of the soil to store it away at considerable depths, but to bring it to the surface by capillary action when needed. The normal rainfall of each month is given in the preceding table from which we see that the sum for October, November, and December is 3.25 inches, and for January, February, March, April, and May 5.97 inches, making the total for the wet season 9.22 inches. For the dry season, June–September, the total is 0.31 inches. The actual rainfalls for the successive wet and dry seasons have been as follows, according to Mr. Carpenter's table:

Wet season.		Dry season.	
October to May.	Rainfall.	June to September.	Rainfall.
	Inches.		*Inches.*
1849-50	....	1850	0.68
1850-51	8.41	1851	0.02
1851-52	9.88	1852	0.40
1852-53	10.84	1853	0.26
1853-54	10.99	1854	1.53
1854-55	12.17	1855	0.04
1855-56	9.85	1856	0.07
1856-57	4.78	1857	0.06
1857-58	7.56	1858	0.33
1858-59	6.59	1859	0.02
1859-60	6.70	1860	0.19
1860-61	7.76	1861	1.78
1861-62	15.75	1862	0.59
1862-63	3.76	1863	0.36
1863-64	5.25	1864	0.12
1864-65	9.63	1865	1.30
1865-66	11.63	1866	0.10
1866-67	13.93	1867	0.30
1867-68	11.44	1868	0.56
1868-69	11.22	1869	0.05
1869-70	5.54	1870	0.11
1870-71	5.06	1871	0.00
1871-72	7.36	1872	0.18
1872-73	8.18	1873	1.95
1873-74	15.07	1874	0.23
1874-75	5.82	1875	0.62
1875-76	9.99	1876	0.17
1876-77	3.66	1877	0.00
1877-78	16.10	1878	0.16
1878-79	7.88	1879	0.07
1879-80	14.77	1880	0.47
1880-81	9.26	1881	0 10
1881-82	9.50	1882	0.08
1882-83	4.92	1883	0.08
1883-84	25.97	1884	0.[illegible]8
1884-85	8.80	1885	0.19
1885-86	16.83	1886	0.07
1886-87	8.33	1887	0.05
1887-88	9.82	1888	0.09
1888-89	11.05	1889	0.14
1889-90	14.98	1890	0.65
1890-91	10.47	1891	0.13
1891-92	8.65	1892	0.18
1892-93	9.21	1893	0.00
1893-94	5.01	1894	0.06
1894-95	11.86	1895	0.01
1895-96	6.34	1896	0.14
1896-97	11.66	1897	0.01
1897-98	4.98	1898	0.09
1898-99	5.31	1899	0.34
Average	9.[illegible]1	Average	0.30

This important table shows that there have been eighteen wet seasons in which rain has been abundant and five seasons in which the rainfall has been less than 5 inches, and therefore decidedly insufficient. The smallest amounts were 3.66 inches for the season of 1876–77, and 3.76 inches for that of 1862–63. The number of times that any given rainfall occurred is as follows:

Wet season.		Dry season.	
Rainfall.	No. of cases.	Rainfall.	No. of cases.
3.00- 4.99	5	0.00 0.49	41
5.00- 6.99	9	0.50-0.99	5
7.00- 8.99	9	1.00-1.50	1
9.00-10.99	11	1.50-2.00	3
11.00-12.99	7		
13.00-14.99	3		
15.00-16.99	4		
17.00, etc	1		
Total	49	Total	50

This table shows that there is a fair prospect of having 15 or 16 inches of rainfall during the wet season four times in fifty years, or once every thirteen years, but that rainfalls above that are much less likely. On the other hand, rainfalls of 3 and 4 inches occur on the average once in every ten years, and rainfalls less than that are about as likely to occur as the great rainfalls above 17 inches. There is no evidence of any periodicity except a slight tendency for the large and small rainfalls, respectively, to occur in groups. Eight of the larger rainfalls have occurred in isolated seasons, and ten of them in groups of three and four each. The small rainfalls have also occurred in groups of about three years.

There is nothing to show how local or general were the rains recorded by the San Diego gage, therefore any deductions from its records may not be strictly applicable to the surrounding district. It would, however, seem that there is very little likelihood that the rainfall for the season 1899–1900 will be smaller than 4 inches, so that the three seasons just past will represent nothing worse than has happened twice before within fifty years, namely, between 1855 and 1860 and between 1869 and 1872. It is now very easy for the planter to estimate how many bad seasons he will have in fifty years and what proportion of capital must be devoted to the storage of water in order to make agriculture profitable on the average of any given number of consecutive years at San Diego.

WIND-ROSES FOR OKLAHOMA.

In the January report of the Oklahoma section Mr. C. M. Strong publishes an extremely interesting bit of climatological work, namely, a so-called wind-rose for the prediction of rainfall. The ordinary wind-rose gives the total number of times of occurrence or the total amount of any meteorological phenomenon, in connection with the wind prevailing at that moment, and shows, for instance, that the northwest wind *is* cold, or that rainfall occurs *with* a southeast wind. But Mr. Strong's table shows what *will follow* a given wind within twelve hours, and that, too, for each month of the year. Apparently it is compiled by counting the number of times that rain fell as recorded at either 8 a. m. or 8 p. m., and accrediting this rain to the wind recorded at the preceding observation. It is based on the nine years 1891–99, inclusive, and we copy it as follows:

TABLE 1.—*Showing the number of times precipitation followed the respective winds within twelve hours.*

Direction.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Average per cent.
North	22	21	14	13	8	5	5	5	9	12	13	17	15
Northeast	10	10	12	7	15	11	19	7	11	4	6	16	13
East	3	2	10	5	11	7	6	7	5	4	3	7	7
Southeast	20	17	23	35	38	34	28	22	13	21	22	9	29
South	20	12	19	27	30	29	20	21	14	19	15	24	26
Southwest	5	0	7	0	7	5	4	5	2	2	2	6	5
West	0	0	0	0	1	0	2	1	0	0	0	0	1
Northwest	3	3	2	8	2	3	3	4	2	1	2	3	4

TABLE 2.—*Showing total number of times each wind direction was observed for each year from* 1891 *to* 1899, *inclusive.*

Year.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm.
1891	126	75	37	208	154	47	12	50	21
1892	128	73	39	195	148	53	18	59	19
1893	116	68	24	180	158	82	18	67	17
1894	119	75	21	181	197	102	22	47	16
1895	152	57	16	133	199	81	18	65	9
1896	127	68	19	162	210	75	15	50	6
1897	126	69	32	110	231	83	20	57	2
1898	134	55	58	93	243	48	28	68	3
1899	128	66	68	80	270	46	17	52	3
Average per cent	18	9	5	20	28	9	2	8	1

CHARLES G. BOERNER.

We regret to have to announce the death of one of our most esteemed voluntary observers, Mr. Charles G. Boerner, at Vevay, Ind., in the seventy-third year of his age.

In the summer of 1867 the Editor began the organization of a system of meteorological stations in connection with the work of the astronomical observatory at Cincinnati, Ohio, and at this time received a visit from Mr. Charles G. Boerner, of Vevay, Ind., who was already known to him as a skillful horologist and a faithful meteorological observer. We learn that Mr. Boerner was born in the village of Artern, in Prussian Saxony, on April 14, 1827. His father, Charles G. Boerner, was a graduate of the University of Halle, and a watch manufacturer at Artern. The son, Charles, Jr., graduated at Erfurt, became an expert watchmaker, and was for a year assistant at Dresden Observatory. In 1847 he came, with his parents, to Detroit, Mich., but in 1849 settled in Cincinnati, and in 1864 moved to Vevay and went into business with his brother.

Mr. Boerner was a Fellow of the American Association for the Advancement of Science, and an active member of the Cincinnati Society of Natural History. He began his system of meteorological observations for the Smithsonian Institution in November, 1864, and continued them as a voluntary observer of the Weather Bureau. With the assistance of the members of his family this record has been continuous up to the present time, and his daughter, Miss Frederica Boerner, will maintain it for the future. His work has always been distinguished for extreme neatness and accuracy, and the numerous special observations and notes recorded by him show a wide appreciation of many aspects of meteorology. His complete record for thirty-five years in one location has made Vevay one of the climatological centers of the United States. His library and geological collections show fine taste and broad intellectual sympathies. Mr. Boerner was married in 1853 and leaves a wife and five children. He enjoyed the highest esteem of every member of the community. He was active in every good work and his place will not easily be filled.

ARTIFICIAL RAIN.

The question perpetually arises in the popular mind as to whether man can not produce rain or drought according as his needs may dictate. The possibility of doing this is never questioned by barbarians, who have their professional rain makers and great medicine men, and superstitiously attribute to them all power over nature. In some parts of the Christian world it has been believed that man could bring about rain or drought, not by his own power, but by intercession with the Creator, who would, perhaps, work a miracle on his behalf. During the past thousand years miracles have been confessedly rare, and some consider it almost impious for man to dare to interfere with the operations of nature on a large scale; some even refuse to be doctored for disease.

The recognition of the truths revealed by modern science has made it evident that man can affect the weather only by understanding and making use of the laws of nature. He must do it in a natural or scientific way, not through any supernatural power or in any miraculous way. In fact, those who have a very imperfect knowledge of the laws of nature, if any at all, are often inclined to believe that there really must be some process known to science, or still to be discovered, by which man can bring abundant rain from the clouds when and where he needs it. They point to the popular belief that rain follows great battles, as proving that there is some way by which to affect the clouds—it may be through the noise of the battle, or it may be the burning of the gunpowder, or it may be a possible electric disturbance. They point to the reputed influence of lightning rods, which are supposed to draw the lightning from the skies and prevent the formation of hail.

In these and other matters there is abundant room for self-deception. It would be a great mistake to conclude that any battle by reason of its noise, or heat, or gunpowder has had any effect in the way of producing rain, or that the lightning rods have had any effect in producing or preventing hail. The statistics that are supposed to substantiate such conclusions do not really prove anything of the kind, and yet many are deceived by them because in reasoning upon the phenomena of nature they forget to apply the simplest laws of logic, and are carried away by emotions or preconceived opinions or the plausible suggestions of others. This is not at all singular, for the history of man's progress in knowledge is the history of a long series of mistakes covering thousands and tens of thousands of years. All have to learn by bitter experience, and if science seems to have made rapid progress during the past century, that should not blind our eyes to the fact that errors may still prevail among the professional scientists as well as the rest of mankind.

In the special matter of the artificial formation of rain we heartily indorse the statement that if it is in any way possible to bring this about we must labor to discover it; in fact, we eventually shall discover the way, if there be one, but thus far nothing has been accomplished to justify us in believing that feasible methods exist or are likely to exist. Various methods have had their advocates both in Europe and America, and the citizens of the United States, with a nervous energy that is greatly to be admired, have given a full and fair trial, at great expense, to several methods advocated by men of imperious natures that would brook no denial short of nature's own experimental demonstration of their errors. Thus the rain-making by explosives was most thoroughly tested by order of Congress at an expense to the public of many thousands of dollars, and the results have been discussed sufficiently, both in public and private, to show that nothing in the way of rain, and probably nothing in the way of cloud or mist was produced. One of the first experimental trials was made quite near Washington, D. C., at nighttime November 2–3, 1892, when a series of clouds with showers were passing over the neighboring country, and these continued right along for several hours quite independent of the bombardment. The reports from numerous observers showed that as the showers moved along over the earth's surface those in front of it reported that the noise of the exploding dynamite occurred just before the shower; those in the wake of the shower reported that the shower came before the explosion, while those in the midst of the shower, of course, heard the explosion while it was raining. There was no evidence that the explosion had any effect on the clouds. The present writer took careful observations in Washington, D. C., during the whole of this first experiment, and has also studied the subsequent experiments with explosives sufficiently to feel warranted in saying that no rainfall was produced by bombardment.

About that time we began to hear of a "famous Australian method of producing rain practised by Frank Melbourne in Australia," who was said to have recently returned home to Ohio and was experimenting in that State. Beginning at Canton, Ohio, on May 7, 1891, he subsequently went to Cheyenne, Wyo., Kelton, Utah, and was at Goodland, Kans., in October, 1891. He was known as the "rain wizard." His method consisted in locking himself in a barn, house, freight car, or other room wherein he made a fire and burned or evaporated certain chemicals, whose smoke rose through the roof out of some impromptu chimney or stove pipe and dissipated

itself in the thin air. Of course Melbourne claimed that the chemicals exerted a great influence on the atmosphere and forced rain to come. Occasionally rain did come after one, two, or three days of a chemical performance, but equally often it did not come. The cases of apparent success published in his pamphlet of April, 1892, were attested by the signatures of innumerable citizens, but these attestations, although they generally state "we believe that Mr. Melbourne has done more than he promised, and has produced the rain," yet, in fact, simply amounted to a record of the fact that rain did follow within four days from the time of his setting to work, and that "we are unable to account for it in any other way." The pamphlets published by Melbourne and the free advertisement in the newspapers produced so great a popular demand for his services in the arid regions that it really was a paying investment to hire him to attend a local fair or to "operate" in any locality. The twenty-five cents admission fee to see the "operations" were sure to cover expenses. The Weather Bureau was often importuned for advice as to when he should be called to any given town, and whether the inhabitants would be justified in paying him his fee of several hundred dollars. Eventually, a prominent railroad, through its enterprising business manager, rigged up a car for his use, and during the years 1892–4 made it convenient for all the citizens on its lines of road to invoke the aid of "the rain producer." Of course there were numerous cases in which the operations were followed by rain; those who studied the Daily Weather Map could see at a glance that these rains accorded with the general weather conditions and had nothing to do with the rain-making operations. So long as frequent rains occurred, although they were natural and were predicted by the Weather Bureau on the basis of the weather map from day to day, yet, the farmers of Iowa, Kansas, and Nebraska, ignoring this fact, were sure to accredit all success to Mr. Melbourne. Apparently, it was at first a profitable enterprise for the railroad, whose general manager wrote to us as follows in August, 1894.

The expense of the efforts has, with very rare exceptions, been our own and borne by the company. If good has resulted, the company can claim the benefit of it, and if the conditions which followed the operations would have followed them naturally, no one has been deceived except the company, because, with one or two exceptions, it has paid the bill.

Since 1894 several imitators of Melbourne's methods have occasionally been heard from. In March, 1896, Mr. W. Hazenflug, of Yates Center, Kans., was said to have patented a rain-making device—"an especially constructed gun, 14 feet long, that discharged a moisture-producing substance to a height of 18 miles and produced a shower of from 3 to 5 inches of rain within twenty-four hours at a small cost of $6.00." America is not alone in these matters; on October 23, 1893, a prominent scientific journal of France recorded that A. Baudounin ran up a kite to a height of 1,200 metres into a cloud and produced sprinkles of rain, and that he had often thus made it rain in Tunis, Africa.

During the last great drought in California, 1898–99, the citizens of one city authorized an extensive and expensive system of experiments by gases and by cannon, but were fortunately saved the necessity of actually wasting their money by the fact that an abundant rain fell naturally just before they were ready to begin their own operations.

Occasionally we still receive newspaper items reviving the old story that floods of rain were broken up by cannonading at Rome, or that rain was produced by cannonading in Italy, or that hailstorms were averted from a special vineyard that was protected by lightning rods while neighboring vineyards suffered. These are all repetitions of the same old myths or repetitions of useless experiments, and the intelligent reader may dismiss them as having no foundation. No matter how severely his land may be suffering from drought or flood, he should seek some other mode of relief and not waste his time and money in efforts to change the nature of the clouds or the atmosphere.

In letters lately received from a gentleman in Helix, Cal., the writer says:

I have a letter from a man in Kansas, who, during five years, made 200 experiments with the discharge of gases, and declares that in 90 per cent of the cases they were successful, and his statement is fully confirmed by the assistant general manager of the railroad that lent him a traveling car, and in fact, employed him. * * * Will you kindly specify what gases have been experimented with by the Government, and then I will tell you what he used. If you have thoroughly tested the same gas, then, of course, I can believe there is nothing in it. If not, then, I trust you will apply for the use of that $5,000 that was repaid into the treasury, and have a thorough test made around San Diego. * * * The present winter threatens to be another dry one, and the orchardists are in dispair—it means ruin to many. The water companies say if they have to pump again they will have to charge us 10 cents for 1,000 gallons instead of 5 cents as last year. * * * I only wish to be satisfied that you have entirely overlooked the tests I name (i. e. the method of the Kansas operator—Ed.) or I would give you the facts now, but your specialists having reported that *it can't be done*, are, in my opinion, biased, and will pooh-pooh every one else's tests. The man in question says he used 20 tons of chemicals; that although he failed in some places he succeeded in 90 per cent. Is it likely he would have gone on using 20 tons of chemicals at his own cost, if it was a dead failure? He has no motive to gain; he has made the recipe public, and why then should he lie about it? * * * The reason why nothing is heard of this man's success is obvious. As most people get all the rain they want the public does not concern itself about the matter.

The honest indignation of our correspondent at the supposed shabby official treatment of a man in Kansas who has thus greatly and generously benefited his countrymen can best be met by the above given public statement of the simple facts of the case as learned by the present writer at the time of their occurrence, and we publish them for the benefit and guidance of all. It is not necessary for the Weather Bureau to try Mr. Melbourne's chemicals. He himself and his railroad company did that for us to perfection. The full official statement of his results day by day during May, June, July, and August, 1892, are now before us, and justify the statement that rain followed when the weather conditions were favorable for rain and when the local Weather Bureau man, with the weather chart before him, would have predicted local rains, such as occur in the summer time, without any regard to the chemical operations. Moreover, our correspondent may rest assured that the twenty tons of chemicals and other expenses were paid for by the railroad company, as shown by the above quotation from the letter of the general manager, probably until it was found that the company was losing too much money by the operation, and perhaps also a little self respect in perpetuating the delusion.

We may add further that if the Kansas recipe of chemicals appropriate to the production of rain is known to our correspondent at Helix, and if he and his neighbors wish to try the experiment during the next season of drought, there is certainly no reason why they should not do so. It seems absolutely necessary that the experiment should be tried over and over again, generation after generation, in order to show its folly to those who can only be guided by their own personal experience

THE WEATHER MAKER.

In connection with the preceding, the Editor recalls the following passage in an interesting book by E. Gerard, published in New York in 1888, entitled The Land beyond the Forest, which gives an account of the natives of Transylvania. As many of those now living in the United States have emigrated from countries whose inhabitants still retain beliefs in these stories of the old world, it is not surprising that we

have among us those who readily believe in the old and the new errors that start up from time to time and with the help of the daily newspapers preserve a wandering existence like the will-o'-the-wisp.

My old village oracle told me many stories about a man she had known, who used to go about the country with a small black bag in which were a little book, a little stick, and a bunch of herbs. Whenever a storm was brewing he was to be seen standing on some rising piece of ground, and repeating his formulas against the gathering clouds. "People used to abuse him," she said, "and to say that he was in league with the devil; but I never saw him do any harm, and now that he is dead there are many who regret him, for since then we have had heavier hailstorms than ever were known in his time."

Instances of weather makers are also common in Germany. We are told that there used to live in Suabia long ago a pastor renouned for his proficiency in exorcising the weather, and whenever a thunderstorm came on he would stand at the open window invoking the clouds till they had all dispearsed. But the work was heavy and difficult to do, and the pastor used frequently to be so exhausted after dispersing a storm that large drops of perspiration would trickle down his face.

We are also told that many years ago, in the village of Wermesch, there lived a peasant who, whenever a thunderstorm was seen approaching, used to take his stand in front of it armed with an axe, by which means he always turned the storm aside. One day, when an unusually heavy storm was seen approaching, the weather maker, as usual, placed himself in front of it, and hurled the axe up into the clouds. The storm passed by, the axe did not fall down to the earth again. Many years later, the same peasant taking a journey farther into the land, entered the hut of a Wallachian, and there, to his astonishment, found the axe he had thrown into the thunderclouds several years previously. This Wallachian was a still greater sorcerer in weather making than the Wermesch peasant, and had therefore succeeded in getting the axe down again from the sky.

There are many old formulas and incantations bearing on this subject to be found in ancient chronicles, of which the following one bears a date of the sixteenth century:

Formula.—And the Lord went forth down a long and ancient road, and there was met by an exceeding large, black cloud; and the Lord spoke thus to it: "Where goest thou, thou large, black cloud? Where goest thou go?" Then spoke the cloud, "I am sent to do an injury to the poor men, to wash away the roots of his vines, and to overthrow the grapes." But the Lord spoke, "Turn back, turn back, thou big black cloud, and do not wander forth to do an injury to the poor man, but go to the wild forest and wash away the roots of the big oak tree and overthrow its leaves. Saint Peter, do thou draw thy sharp sword and cut in twain the big black cloud, that it may not go forth to do an injury to the poor men."

Underneath this incantation the writer has put the following memorandum: "Probatum an sit me latet probet quicunque vult."

In many houses it is still customary to burn juniper berries during a thunderstorm, or to stick a knife in the ground before the house. Like the Roumanian, the Saxon also considers it unsafe to point at an approaching thunderstorm; but this is a belief shared by many people, I understand.

THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Chief of Division of Meteorological Records.

The month for the most part was warm and dry. Low temperatures prevailed east of the Rocky Mountains from the 1st to the 5th, but from that date until the 25th a number of lows, first appearing on the weather map over the North Pacific coast and the Southwest, respectively, moved across the country in rapid succession, giving abnormally warm weather in almost all districts. From the 25th until the end of the month several moderate cold waves moved southeastward from Assiniboia carrying the line of freezing temperature to the east Gulf coast and northern Florida on the 30th of the month.

The minimum temperatures of the month were generally recorded from the 1st to the 3d and from the 26th to the 31st. No very severe cold waves occurred.

The rainfall on the California coast was light and scattered after the 8th, and the month as a whole gave less than the normal amount.

The snowfall was light in all districts and quickly disappeared. Less than an inch fell during the entire month over probably two-thirds of the total area of the United States. At the end of the month there was no snow upon the ground east of the Rocky Mountains, except in the Ohio Valley, the Lake region, New England, and a portion of the Middle States.

PRESSURE.

The distribution of monthly mean pressure is graphically shown on Chart IV, and the numerical values are given in Tables I and II.

In connection with the pressure distribution for the current month it is to be noticed that a ridge of high pressure extends from eastern Tennessee to eastern Oregon and Washington. This type of pressure distribution is generally contemporary with dry weather east of the Rocky Mountains. As compared with the preceding month, pressure fell in the majority of districts.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	28.8	+ 2.1	....	....
Middle Atlantic	12	34.7	+ 2.2	....	....
South Atlantic	10	46.3	− 0.2	....	....
Florida Peninsula	7	57.9	− 2.2	....	....
East Gulf	7	48.8	− 1.0	....	....
West Gulf	7	50.0	+ 3.4	....	....
Ohio Valley and Tennessee	12	37.1	+ 2.8	....	....
Lower Lake	8	28.6	+ 3.2	....	....
Upper Lake	9	24.2	+ 6.6	....	....
North Dakota	7	17.0	+14.6	....	....
Upper Mississippi Valley	11	29.2	+ 8.2	....	....
Missouri Valley	10	30.3	+10.1	....	....
Northern Slope	7	30.2	+13.5	....	....
Middle Slope	6	36.8	+ 8.8	....	....
Southern Slope	6	43.3	+ 6.4	....	....
Southern Plateau	13	42.8	+ 6.7	....	....
Middle Plateau	9	31.6	+ 8.1	....	....
Northern Plateau	10	34.5	+10.0	....	....
North Pacific	9	43.1	+ 4.5	....	....
Middle Pacific	5	49.8	+ 2.7	....	....
South Pacific	4	54.6	+ 4.0	....	....

Temperature was markedly above normal in all districts save the South Atlantic States and Florida. The average excess ranged from about 15° daily in Montana and North Dakota to less than 1° in southeastern Tennessee and about 3° on the Pacific coast. The monthly means ranged from about 12° in northern Minnesota to 50° and over in southern

Texas and Florida. The maximum temperatures ranged from about 45° in the coldest regions to about 80° in the warmest, and the range in the minimum temperatures was even greater, viz, from 30° below zero in the Lake Superior region to 29° above on the Texas coast.

In Canada.—Prof. R. F. Stupart says:

The temperature was above average throughout the Dominion, and to a considerable amount in nearly all localities. In southern Alberta the large excess of 19° was recorded, and the smallest amount, 2° above average, occurred along the shores of Lake Erie.

PRECIPITATION.

Less than the normal amount of rain and snow fell in practically all districts, the only exception being a portion of New England and the Florida Peninsula. The district averages and departures are given in the table below.

Snowfall was also deficient in almost all districts. Over the western half of the Lower Peninsula of Michigan, and generally over the upper peninsula, nearly the average amount of snow fell, and there was a considerable fall of snow in the Adirondacks, and locally in the lower Lake region, Vermont, and New Hampshire.

The Climate and Crop Services of the Rocky Mountain region generally report less snow than usual.

The total depth of snow for the month, and the amount on the ground at the end of the month are shown by Charts No. VIII and IX, respectively, and the numerical values appear in Table II.

In Canada.—Professor Stupart says:

The precipitation was above average to a considerable amount in the Maritime Provinces, except in portions of Prince Edward Island, where the average was not reached. Elsewhere throughout the Dominion, except locally, the precipitation was below the average, the greatest discrepancy occurring in British Columbia. The local exceptions were Montreal, nearly 2 inches above the average, Parry Sound, 0.5 inch above, Minnedosa, Battleford, and Edmonton, 0.2 inches above. The precipitation over the greater part of Canada was largely rain, until the latter part of the month, when it was chiefly snow, especially in Ontario and Quebec. On the last day of the month snow covered the Province of Quebec to a depth of from 13 to 30 inches. In northern New Brunswick there was from 10 to 20 inches, and in northern Ontario, and along the north shores of Lake Superior to the Lake of the Woods, from 10 to 24 inches. In southern Ontario, and also in Manitoba and the Territories, there was only a light covering for the most part, and in the southern part of the Maritime Provinces and the Territories, and also over the greater portion of British Columbia, there was none.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	4.40	110	+0.4	....
Middle Atlantic	12	2.68	73	−1.0	....
South Atlantic	10	3.31	79	−0.9	....
Florida Peninsula	7	3.26	119	+0.5	....
East Gulf	7	2.94	56	−2.3	....
West Gulf	7	3.42	97	−0.1	....
Ohio Valley and Tennessee	12	2.64	62	−1.6	....
Lower Lake	8	2.53	96	−0.1	....
Upper Lake	9	1.29	65	−0.7	....
North Dakota	7	0.31	38	−0.5	....
Upper Mississippi Valley	11	1.12	65	−0.6	....
Missouri Valley	10	0.44	42	−0.6	....
Northern Slope	7	0.11	15	−0.6	....
Middle Slope	6	0.24	29	−0.6	....
Southern Slope	6	0.47	44	−0.6	....
Southern Plateau	13	0.38	32	−0.8	....
Middle Plateau	9	0.62	44	−0.8	....
Northern Plateau	10	1.00	50	−1.0	....
North Pacific	9	5.59	78	−1.6	....
Middle Pacific	5	4.98	89	−0.6	....
South Pacific	4	1.38	50	−1.4	....

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 11. Louisiana, 21. Mississippi, 10.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 1, 11, 12. Arkansas, 18, 28. California, 5. Colorado, 5. Connecticut, 10, 11, 12, 25, 28, 29. Delaware, 12. Idaho, 1, 2, 23, 24. Illinois, 13, 14, 17. Indiana, 5, 11, 12, 13, 17. Iowa, 10, 11, 15, 16, 17. Kansas, 5, 6. Kentucky, 9, 19. Maine, 1, 7, 12, 20, 21, 25, 26, 29. Maryland, 11, 12, 13, 16, 17, 21, 22, 23, 27, 28, 29, 30, 31. Massachusetts, 11, 12, 16, 21, 25, 26, 28, 29. Michigan, 9, 11, 17, 24. Minnesota, 8. Mississippi, 1, 27. Missouri, 11, 17, 18, 19. Montana, 5, 16, 19. Nebraska, 10, 15. New Hampshire, 7, 10, 11, 12, 18, 21, 25, 28. New Jersey, 11, 14, 28, 29. New Mexico, 8, 17. New York, 7, 8, 10, 11, 12, 15, 18. North Carolina, 27. North Dakota, 13. Ohio, 5, 10, 11, 12, 13, 14, 15, 25. Oklahoma, 28. Oregon, 22, 23. Pennsylvania, 10, 11, 12, 14, 17, 25. South Carolina, 27, 31. South Dakota, 3, 10, 13. Tennessee, 11, 13, 25. Texas, 25, 26, 27, 28, 29. Utah, 3, 15, 19. Vermont, 10, 14, 19, 25. Virginia, 11, 12. Washington, 2, 3, 4, 13, 14, 21, 22, 23. West Virginia, 11, 21. Wisconsin, 9, 17, 24. Wyoming, 14.

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	5.9	+0.1	Missouri Valley	4.7	−0.4
Middle Atlantic	5.5	−0.1	Northern Slope	4.4	−0.2
South Atlantic	4.5	−0.8	Middle Slope	3.8	0.0
Florida Peninsula	5.7	+1.0	Southern Slope	3.8	0.0
East Gulf	5.0	−0.6	Southern Plateau	2.9	0.0
West Gulf	5.6	+0.2	Middle Plateau	4.6	−0.2
Ohio Valley and Tennessee	5.9	−0.5	Northern Plateau	6.4	−0.9
Lower Lake	7.7	+0.2	North Pacific Coast	6.9	−0.2
Upper Lake	7.2	+0.4	Middle Pacific Coast	6.7	+1.6
North Dakota	4.5	−0.2	South Pacific Coast	5.5	+1.4
Upper Mississippi	5.4	+0.1			

HUMIDITY.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	76	0	Missouri Valley	74	−4
Middle Atlantic	75	0	Northern Slope	69	−1
South Atlantic	75	−3	Middle Slope	68	+1
Florida Peninsula	82	0	Southern Slope	70	+6
East Gulf	72	−6	Southern Plateau	43	−8
West Gulf	77	+2	Middle Plateau	68	−1
Ohio Valley and Tennessee	76	−1	Northern Plateau	80	−1
Lower Lake	79	−2	North Pacific Coast	87	0
Upper Lake	84	+2	Middle Pacific Coast	87	+6
North Dakota	79	−2	South Pacific Coast	79	+5
Upper Mississippi	80	+2			

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Block Island, R. I	26	62	w.	Mount Tamalpais, Cal.	9	60	nw.
Boston, Mass	1	50	w.	New York, N. Y	8	56	w.
Do.	2	52	w.	Do.	21	57	nw.
Do.	11	52	e.	Do.	26	76	w.
Do.	12	50	sw.	Do.	27	59	nw.
Do.	27	51	w.	Do.	29	58	nw.
Buffalo, N. Y	2	68	w.	Pierre, S. Dak	24	56	nw.
Cleveland, Ohio	26	52	w.	Point Reyes Light, Cal.	2	60	sw.
Eastport, Me.	1	50	e.	Sioux City, Iowa	24	60	nw.
Do.	29	52	ne.	Woods Hole, Mass.	26	59	nw.
Helena, Mont	23	52	w.	Do.	29	59	sw.
Mount Tamalpais, Cal.	2	64	se.				

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table VII, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 266 thunderstorms were received during the current month as against 426 in 1899 and 167 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 11th, 51; 10th, 36; 9th, 25; 24th, 21.

Reports were most numerous from: Texas, 49; Louisiana, 26; Georgia, 23.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz, 11th to 19th.

The greatest number of reports were received for the following dates: 20th, 48; 21st, 7; 24th, 6.

Reports were most numerous from Minnesota, 19; Montana, 13; South Dakota, 12.

In Canada.—Auroras were reported as follows: Toronto, 20th; Minnedosa, 4th, 5th, 25th, 26th; Banff, 19th; Prince Albert, 22d; Battleford, 5th, 21st, 25th; Barkerville, 24th, 25th, 26th.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Chief of Division of Meteorological Records.

Table I gives, for about 145 Weather Bureau stations making two observations daily and for about 25 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (....).

Table III gives, for 44 stations selected out of 144 that maintain continuous records, the mean hourly temperatures deduced from the Richard thermographs described and figured in the Report of the Chief of the Weather Bureau, 1891-92, p. 29.

Table IV gives, for 44 stations selected out of 142 that maintain continuous records, the mean hourly pressures as automatically registered by Richard barographs, except for Washington, D. C., where Foreman's barograph is in use. Both instruments are described in the Report of the Chief of the Weather Bureau, 1891-92, pp. 26 and 30.

Table V gives, for about 157 stations, the arithmetical means of the hourly movements of the wind ending with the respective hours, as registered automatically by the Robinson anemometer, in conjunction with an electrical recording mechanism, described and illustrated in the Report of the Chief of the Weather Bureau, 1891-92, p. 19.

Table VI gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind. The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table VII gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table VIII gives, for about 95 stations, the average hourly sunshine (in percentages) as derived from the automatic records made by two essentially different types of instruments, designated, respectively, the thermometric recorder and the photographic recorder. The kind of instrument used at each station is indicated in the table by the letter T or P in the column following the name of the station.

Table IX gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes..	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates pr. hr. (ins.)..	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table X gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table XI gives the heights of rivers referred to zeros of gages.

NOTES EXPLANATORY OF THE CHARTS.

Chart I, tracks of centers of high areas, and Chart II, tracks of centers of low areas, are constructed in the same

way. The roman numerals show number and chronological order of highs (Chart I) and lows (Chart II). The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. Within each circle is also given (Chart I) the highest barometric reading and (Chart II) the lowest pressure at or near the center at that time.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level pressure, temperature, and resultant surface winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p. m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and are reduced to sea level and to standard gravity. The reduction for 30 inches of the mercurial barometer, as formerly shown by the marginal figures for each degree of latitude, has already been applied.

Chart V.—Hydrographs for seven principal rivers of the United States.

Chart VI.—Surface temperatures; maximum, minimum, and mean. Lines of equal monthly mean temperature in red; lines of equal maximum temperature in black; and lines of equal minimum temperature (dotted) also in black.

Chart VII.—Percentage of sunshine. The average cloudiness at each Weather Bureau station is determined by numerous personal observations during the day. The difference between the observed cloudiness and 100, it is assumed, represents the percentage of sunshine, and the values thus obtained have been used in preparing Chart VII.

Chart VIII.—The total snowfall. This is based on the reports from regular and voluntary observers, and shows the depth of the snowfall during the month in inches. In general, the depth is shown by lines inclosing areas of equal snowfall, but in special cases figures are also given.

Chart IX.—Snow on ground on January 31, 1900.

Chart X.—Sea-level pressure, temperature, and resultant winds, West Indian stations.

TABLE 1.—*Climatological data for Weather Bureau Stations, January, 1900.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Mean actual, 8 a. m. + 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							28.8	+2.1										76	4.40	+0.4										5.9	
Eastport	76	69	74	29.87	29.96	-.04	23.0	+2.6	48	20	32	1	24	14	40	22	18	76	5.27	+1.3	16	10,900	w.	52	ne.	29	9	6	16	6.5	15.2
Portland, Me	103	81	89	29.86	29.96	-.09	23.9	+1.4	52	19	33	1	4	15	31	22	16	73	6.28	+2.7	16	6,302	sw.	42	se.	29	7	13	11	6.1	19.9
Northfield	872	15	65	29.03	30.04	-.03	17.6	+2.1	49	19	30	-12	3	6	43	15	11	80	2.61	-0.5	11	7,560	s.	48	nw.	21	3	12	16	7.2	25.5
Boston	125	115	181	29.87	30.01	-.06	30.0	+3.0	60	19	40	8	4	21	33	27	22	72	4.20	+0.1	13	9,314	nw.	43	w.	26	7	15	9	5.9	8.3
Nantucket	14	43	54	30.01	30.02	-.01	34.4	+3.0	57	20	42	14	26	27	32	32	28	78	3.20	-0.5	13	10,043	nw.	46	se.	29	7	9	15	6.5	5.2
Woods Hole	22	11	57	30.02	30.04	-.03	32.7	+2.4	55	20	40	11	1	25	30	31	27	82	4.96	+1.2	13	13,153	nw.	59	nw.	26	7	12	12	5.9	4.7
Vineyard Haven	......	20	55	......	......	......	33.4	0.0	59	20	42	12	1	25	27	......	......	......	5.77	+2.2	12	8,210	nw.	42	ne.	29	7	14	10	5.8	7.8
Block Island	27	11	70	30.00	30.03	-.05	33.6	+2.5	57	20	41	15	27	26	28	31	27	74	3.86	-0.3	12	15,305	nw.	62	w.	26	8	16	7	5.0	7.0
Narragansett	......	10	......	......	......	......	29.9	+1.1	54	20	40	3	4	20	34	......	......	......	4.23	-1.1	16	......	w.	......	......	......	20	1	10	......	8.5
New Haven	107	117	140	29.93	30.05	-.06	30.0	+2.5	56	20	39	9	26	21	30	27	22	76	3.60	-0.7	14	7,380	n.	48	nw.	26	18	7	6	4.5	4.5
Mid. Atlan. States.							34.7	+2.2										75	2.68	-1.0										5.5	
Albany	97	84	118	29.94	30.06	-.03	26.2	+3.0	50	23	35	3	31	17	32	24	20	80	2.33	-0.6	11	6,771	s.	34	w.	26	2	14	15	6.8	7.9
Binghamton	875	79	90	......	......	......	27.6	+5.2	53	20	36	3	31	19	31	......	......	......	1.59	-1.4	13	5,941	nw.	33	w.	2	3	7	21	7.9	4.6
New York	314	108	346	29.72	30.07	-.04	33.2	+2.7	56	20	40	10	31	26	26	30	25	75	4.18	+0.1	13	12,917	nw.	76	w.	26	12	12	7	5.0	0.8
Harrisburg	374	94	104	......	......	......	32.2	+1.9	56	23	39	7	31	25	25	......	......	......	2.07	-1.6	12	6,173	w.	48	w.	26	6	10	15	6.6	1.4
Philadelphia	117	168	184	29.97	30.10	-.05	34.8	+2.8	58	23	42	9	31	27	26	31	26	74	3.34	0.0	11	7,515	nw.	36	nw.	26	10	11	10	5.7	2.3
Atlantic City	52	68	76	30.08	30.09	-.02	34.8	+2.3	58	20	42	10	31	27	29	32	28	78	2.40	-1.4	11	9,029	nw.	44	nw.	26	11	12	8	5.0	1.8
Cape May	17	47	51	30.09	30.11	-.01	36.0	+1.6	58	23	42	13	31	30	25	33	......	......	2.80	-1.6	11	7,159	nw.	36	nw.	26	10	12	9	5.3	1.6
Baltimore	123	68	82	29.96	30.10	-.04	36.2	+2.2	62	24	44	10	31	28	26	32	27	74	2.11	-1.2	11	3,932	sw.	26	w.	26	5	15	11	6.2	2.5
Washington	112	59	76	29.99	30.11	-.03	35.2	+2.0	64	23	44	8	30	26	35	30	25	72	1.92	-1.6	11	5,584	nw.	38	w.	26	18	4	9	4.4	2.2
Cape Henry	......	5	34	......	......	......	40.7	+0.5	66	23	49	12	2	33	31	......	......	......	2.94	-1.3	12	9,039	sw.	42	nw.	26	13	9	9	5.1	3.5
Lynchburg	685	83	88	29.35	30.10	-.05	37.6	+0.8	66	16	47	12	2	28	38	33	27	71	4.36	+0.4	7	3,129	nw.	26	nw.	25	13	12	6	4.3	T.
Norfolk	92	102	111	30.02	30.12	-.02	42.0	+1.6	65	18	50	13	2	34	29	37	33	76	2.13	-1.7	9	7,028	s.	42	nw.	26	17	5	9	4.5	1.5
Richmond	144	98	105	......	......	......	39.4	......	68	16	48	12	2	31	37	......	......	......	2.71	......	9	4,866	n.	26	w.	26	13	8	10	4.7	0.3
S. Atlantic States.							45.3	-0.2										75	3.31	-0.9										4.5	
Charlotte	773	68	76	29.27	30.12	-.03	41.4	+0.2	67	16	51	9	2	32	32	36	29	66	2.15	-3.0	7	5,068	ne.	33	nw.	31	19	6	6	3.5	0.8
Hatteras	11	17	36	30.00	30.10	-.03	45.6	-0.1	67	*	51	19	2	40	23	42	40	84	4.50	-1.4	12	10,729	n.	48	nw.	26	12	10	9	4.6	
Kittyhawk	9	12	30	......	......	......	43.6	+1.2	65	*	50	14	2	37	24	......	......	......	5.77	+0.6	8	9,152	......	......	......	......	18	3	10	4.3	2.0
Raleigh	375	93	101	29.72	30.14	-.01	42.6	+1.8	68	16	52	11	2	33	33	37	31	71	2.95	-0.6	11	4,750	sw.	25	w.	31	15	7	9	4.6	2.0
Wilmington	78	82	90	30.04	30.13	-.01	47.2	+0.3	71	23	57	16	2	38	31	41	37	78	6.24	+2.3	10	5,978	w.	34	w.	12	16	4	11	4.5	0.1
Charleston	48	14	92	30.10	30.15	.00	49.9	-0.1	69	25	58	23	2	42	23	43	38	70	3.10	-0.9	11	7,178	n.	34	s.	11	12	9	10	4.5	T.
Columbia	......	5	......	......	......	......	45.2	-0.5	72	16	56	15	2	34	37	......	......	......	1.57	-2.2	9	......	ne.	......	......	......	13	7	11	5.3	0.9
Augusta	180	89	103	29.94	30.14	.00	44.9	-1.7	69	16	55	15	2	34	33	39	35	76	1.65	-2.8	11	4,554	nw.	31	w.	31	16	6	9	4.1	0.2
Savannah	65	79	80	30.06	30.13	-.04	49.9	-1.1	72	23	58	22	2	42	27	44	39	75	3.46	+0.2	10	5,518	n.	30	nw.	31	15	5	11	5.0	
Jacksonville	43	69	84	30.07	30.12	-.02	52.7	-2.5	73	10	61	23	3	45	31	47	44	81	1.71	-1.6	10	5,264	ne.	28	w.	20	14	6	11	4.9	
Florida Peninsula.							62.7	-2.0										82	3.39	+0.7										5.7	
Jupiter	28	13	30	30.04	30.07	-.04	63.8	-1.9	77	18	70	37	3	58	24	58	56	82	3.49	0.0	15	7,965	nw.	31	ne.	4	5	16	10	5.7	
Key West	22	43	50	30.06	30.08	-.01	66.4	-3.3	78	11	70	51	3	63	14	62	60	82	2.32	+0.2	11	8,398	ne.	36	nw.	31	13	8	10	5.2	
Tampa	36	60	67	30.06	30.10	-.04	57.8	-0.9	75	10	66	27	3	49	34	52	49	82	4.36	+1.8	9	4,747	nw.	31	sw.	11	5	15	11	6.1	
East Gulf States.							48.8	-1.0										72	2.94	-2.3										5.0	
Atlanta	1,174	139	156	28.87	30.15	-.03	43.0	+0.5	66	11	51	11	2	35	27	37	31	70	2.32	-3.4	9	8,800	nw.	43	nw.	29	13	7	11	4.8	T.
Macon	370	93	99	......	......	......	44.4	......	67	11	54	10	2	34	34	......	......	......	1.87	......	9	4,755	nw.	26	nw.	31	11	11	9	4.7	T.
Pensacola	56	78	90	......	......	......	51.3	-1.2	69	25	59	23	3	44	25	......	......	......	2.47	-2.2	6	6,896	ne.	36	sw.	11	11	13	7	4.8	
Mobile	57	88	96	30.08	30.15	.00	49.6	-0.9	72	11	58	23	3	41	31	44	39	74	4.12	-1.0	9	4,584	n.	28	sw.	11	10	11	10	5.3	T.
Montgomery	221	100	112	29.90	30.14	-.03	46.5	-1.8	72	11	56	18	2	37	30	41	37	75	3.40	-2.0	8	4,256	ne.	26	nw.	31	15	7	9	4.6	
Meridian	375	84	93	......	......	......	45.2	-1.8	68	7	55	17	3	36	34	......	......	......	2.41	-3.2	7	3,869	w.	33	s.	10	9	11	11	5.5	
Vicksburg	247	65	73	29.85	30.13	-.03	48.6	+1.3	70	23	56	18	29	41	27	42	36	68	1.99	-3.6	8	5,175	se.	24	nw.	28	11	9	11	5.8	T.
New Orleans	54	112	120	30.08	30.14	+.02	52.2	-1.6	70	25	59	29	2	45	22	47	43	75	3.69	-1.5	8	5,612	n.	32	se.	10	12	10	9	5.2	
Port Eads	......	27	......	......	......	......	53.8	-2.9	72	10	62	34	3	46	26	......	......	......	3.14	-1.2	9	......	ne.	......	......	......	13	4	14	......	
West Gulf States.							50.0	+3.4										77	3.42	-0.1										5.6	
Shreveport	249	77	84	29.88	30.15	-.01	48.2	+2.3	74	24	56	17	29	40	31	43	38	71	3.87	-0.7	9	5,012	se.	28	n.	28	11	6	14	5.9	
Fort Smith	457	74	82	29.63	30.14	-.01	43.2	+7.1	70	15	52	12	3	34	31	38	34	76	1.71	-0.7	9	5,258	e.	29	n	28	11	5	15	6.1	0.2
Little Rock	357	93	100	29.76	30.15	-.02	44.4	+3.6	69	15	53	13	29	36	30	41	37	79	2.61	-2.3	6	5,627	nw.	30	nw.	25	10	9	12	5.8	T.
Corpus Christi	20	42	50	30.09	30.11	-.02	57.2	+1.7	73	9	63	29	29	52	31	53	51	83	2.42	-0.5	9	7,425	ne.	33	n.	28	12	9	10	4.9	
Fort Worth	670	106	114	......	......	......	47.3	......	78	24	57	12	29	38	41	......	......	......	0.70	......	6	7,733	nw.	32	n.	28	15	6	10	4.9	0.3
Galveston	54	84	88	30.05	30.10	-.02	54.2	+1.5	68	24	58	31	29	50	21	51	49	83	3.18	-0.5	9	7,035	ne.	30	w.	11	11	6	14	5.8	
Palestine	510	54	61	29.59	30.15	-.02	49.4	+5.6	74	23	58	16	29	41	36	44	40	75	4.70	+0.4	10	4,879	s.	30	e.	10	8	7	16	6.4	0.1
San Antonio	704	95	104	29.36	30.12	-.01	53.3	+1.8	75	23	63	22	29	44	34	47	43	75	5.42	+3.7	9	5,775	n.	38	n.	28	9	12	10	5.2	
Ohio Val. & Tenn.							37.1	+2.8										76	2.64	-1.6										5.9	
Chattanooga	762	106	112	29.33	30.18	+.02	40.8	-0.2	67	16	50	11	29	31	33	35	29	70	4.12	-2.1	5	4,974	sw.	33	w.	25	9	16	6	5.0	T.
Knoxville	1,004	10	88	29.06	30.16	-.02	38.3	+0.6	65	16	47	6	2	29	30	34	29	76	3.35	-2.2	8	5,435	ne.	37	s.	11	11	6	14	5.9	0.2
Memphis	399	140	154	29.71	30.16	.00	44.5	+4.6	69	24	52	14	29	37	27	39	32	65	2.21	-3.3	9	7,507	nw.	30	nw.	25	10	11	10	5.4	0.2
Nashville	545	128	134	29.56	30.16	+.01	39.8	+1.6	68	16	48	8	29	31	31	36	32	76	2.61	-2.5	9	4,592	s.	25	nw.	25	7	12	12	6.0	0.1
Lexington	990	75	102	......	......	......	35.9	+2.6	62	15	44	-1	29	28	31	......	......	......	2.13	-1.7	11	8,567	sw.	37	w.	25	11	5	15	6.1	1.3
Louisville	525	114	136	29.53	30.13	-.03	38.0	+3.9	65	17	46	4	29	30	34	35	31	79	3.10	-0.9	10	6,638	sw.	31	nw.	25	11	10	10	5.5	0.8
Evansville	434	72	82	......	......	......	38.0	......	64	23	45	6	31	31	34	......	......	......	1.89	......	9	5,736	s.	32	s.	24	14	7	10	4.9	0.2
Indianapolis	823	154	164	29.18	30.11	-.03	33.0	+4.7	61	24	40	-2	31	25	37	29	25	76	1.54	-1.4	11	8,602	sw.	39	sw.	24	8	9	14	6.3	1.2
Cincinnati	628	152	157	29.42	30.12	-.03	35.4	+2.9	62	15	43	2	29	28	36	32	28	76	2.54	-0.9	13	6,369	se.	28	nw.	25	12	5	14	5.7	2.0
Columbus	824	87	100	29.18	30.10	-.03	32.8	+4.4	58	24	40	0	29	25	34	29	26	82	3.01	-0.3	13	6,549	sw.	25	w.	25	9	5	17	6.5	0.5
Pittsburg	842	116	123	29.15	30.09	-.05	34.0	+3.4	59	24	42	2	31	26	30	30	27	80	1.54	-1.6	16	5,672	nw.	25	nw.	14	7	8	16	6.7	2.5
Parkersburg	638	77	84	29.42	30.14	.00	35.5	+2.8	64	17	44	4	29	27	30	32	30	84	2.93	-0.2	16	5,507	s.	36	nw.	25	11	9	11	6.0	0.8
Elkins	1,940	41	50	......	......	......	31.4	......	60	15	42	-6	4	21	39	......	......	......	2.07	......	18	4,238	w.	29	s.	11	5	11	15	6.8	5.3
Lower Lake Region.							28.6	+3.2										79	2.53	-0.1										7.7	
Buffalo	768	178	206	29.17	30.04	-.04	27.6	+3.2	46	19	34	2	26	22	29	25	22	79	3.82	+0.8	18	12,605	w.	68	w.	2	0	13	18	8.1	9.4
Oswego	335	76	87	29.64	30.03	-.06	25.6	+1.3	46	22	34	4	31	18	32	24	20	79	4.06	+1.1	19	10,232	se.	40	nw.	27	1	10	20	8.0	22.8
Rochester	523	81	90	29.43	30.03	-.05	27.4	+3.5	50	22	34	2	31	21	26	24	20	76	4.31	+1.2	22	7,150	sw.	34	sw.	2	4	10	17	7.5	24.7
Erie	714	92	102	29.25	30.05	-.04	29.8	+2.9	50	25	36	0	31	23	30	27	25	83	2.61	-0.7	17	10,420	sw.	40	s.	24	1	6	24	8.1	3.0
Cleveland	762	190	201	29.20	30.06	-.04	30.1	+3.9	54	24	37	0	31	24	38	27	23	77	2.23	-0.3	13	13,081	sw.	52	w.	26	3	10	18	7.6	4.9
Sandusky	629	62	74	29.36	30.07	-.04	30.4	+3.9	56	24	37	-1	31	24	31	27	23	76	1.35	-0.9	9	7,310	sw.	34	nw.	26	2	7	22	8.1	1.2
Toledo	628	123	128	29.36	30.07	-.03	29.3	+3.2	54	24	36	-2	31	22	32	26	23	79	0.78	-1.4	10	8,656	sw.	30	w.	31	5	10	16	6.8	2.0
Detroit	730	160	166	29.22	30.05	-.01	28.3	+3.8	49	24	35	-2	31	22	32	26	23	81	1.14	-0.8	12	8,703	sw.	36	sw.	24	2	10	19	7.7	5.4
Upper Lake Region.							24.2	+6.6										84	1.29	-0.7										7.2	
Alpena	609	61	65	29.30	29.99	-.07	21.6	+6.5	46	19	31	-4	31	18	37	23	20	84	0.77	-1.7	12	8,541	nw.	42	s.	24	3	3	25	8.4	6.4
Escanaba	612	43	57	29.30	30.00	-.06	22.1	+8.1	43	7	30	-6	30	15	30	20	18	86	0.67	-0.9	11	7,525	w.	31	nw.	7	1	8	22	8.3	3.5
Grand Haven	628	55	64	29.31	30.03	-.03	28.0	+3.8	49	24	34	0	31	22	28	26	25	93	2.71	0.0	15	8,750	nw.	42	sw.	29	5	5	21	7.8	11.0
Marquette	734	67	95	29.12	29.96	-.09	23.0	+7.0	51	19	30	-4	31	16	36	22	20	88	2.01	0.0	19	9,565	nw.	44	sw.	9	1	6	24	8.5	22.2
Port Huron	639	70	108	29.33	30.06	-.03	26.6	+4.8	48	24	33	-4	31	20	33	25	23	87	1.26	-0.8	13	9,068	s.	34	sw.	28	6	11	14	6.7	13.2
Sault Ste. Marie	614	40	61	29.26	29.96	-.07	20.0	+5.7	41	22	28	-14	31	12	42	18	15	84	1.19	-0.6	15	7,110	se.	48	nw.	10	4	7	20	7.7	11.6
Chicago	824	241	274	29.16	30.08	-.02	28.7	+5.3	56	24	35	-8	31	22	29	26	23	84	1.21	-0.9	7	13,343	w.	48	sw.	24	7	10	14	6.4	0.3
Milwaukee	681	124	142	29.29	30.07	-.02	27.4	+8.0	49	24	34	-10	31	21	31	24	19	72	1.63	-0.5	9	9,119	w.	38	se.	24	12	6	13	5.8	5.7
Green Bay	617	49	57	29.35	30.06	-.04	23.4	+9.2	44	7	31	-12	30	16	29	20	16	77	0.77	-1.6	8	6,938	sw	28	n.	20	4	13	14	6.9	6.3
Duluth	702	95	106	29.22	30.03	-.08	18.4	+8.0	48	22	26	-22	31	10	26	17	14	82	0.71	-0.4	9	7,234	sw.	42	nw.	31	9	12	10	5.7	7.5
North Dakota.							17.3	+15.3										79	0.21	-0.4										4.5	
Moorhead	935	54	60	29.02	30.11	-.06	15.6	+16.5	52	19	27	-22	31	5	42	14	12	90	0.32	-0.4	8	8,300	nw.	36	nw.	24	9	11	11	5.4	3.2
Bismarck	1,674	16	29	28.25	30.15	-.04	18.6	+14.1	51	19	31	-20	31	6	38	15	7	64	0.28	-0.3	4	6,685	nw.	36	nw.	29	16	8	7	4.4	2.8
Williston	1,872	15	31	28.01	30.13	-.04	19.1	+15.2	53	19	32	-21	28	7	50	16	13	83	0.03	-0.6	3	6,239	n.	48	n.	24	21	8	2	3.7	0.3

TABLE I.—*Climatological data for Weather Bureau Stations, January, 1900*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. + 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Upper Miss. Valley.							29.2	+ 8.2										80	1.12	— 0.6										5.4	
Minneapolis	....	99	208	....	....	....	21.2	+ 9.3	51	22	30	—19	31	12	35	....	....	....	0.62	— 0.2	8	9,570	nw.	42	nw.	24	7	11	13	....	6.1
St. Paul	837	114	124	29.11	30.08	— .07	21.1	+10.5	51	22	30	—18	31	13	34	19	16	82	0.66	— 0.3	9	7,006	nw.	38	nw.	24	8	10	13	5.7	4.5
La Crosse	720	70	78	....	....	....	22.4	+ 7.7	46	22	29	—14	31	15	29	....	....	....	0.71	— 0.6	8	6,070	s.	30	nw.	29	7	9	15	6.5	6.8
Davenport	606	71	79	29.41	30.10	— .04	28.2	+ 8.2	52	24	36	— 8	31	21	30	25	22	81	1.27	— 0.4	7	6,284	nw.	27	w.	28	15	4	12	4.9	1.6
Des Moines	867	84	88	29.17	30.16	— .01	27.6	+10.1	54	22	37	—10	28	18	40	25	22	82	0.20	— 1.1	3	6,117	n.	30	sw.	29	10	10	11	5.5	0.6
Dubuque	698	101	109	29.31	30.11	— .01	25.6	+ 8.3	49	22	33	—13	31	18	32	23	21	85	1.15	— 0.5	7	6,452	nw.	34	nw.	25	13	6	12	5.5	4.9
Keokuk	614	63	78	29.43	30.12	— .02	31.9	+ 8.7	57	22	40	— 4	31	23	33	27	23	80	2.46	+ 0.7	6	6,371	nw.	32	sw.	29	15	9	7	4.0	T.
Cairo	359	87	93	29.74	30.14	— .01	39.8	+ 5.1	65	23	48	9	29	32	30	36	32	79	2.00	— 1.8	8	6,518	s.	29	nw.	25	5	15	11	5.9	0.6
Springfield, Ill	644	82	92	29.40	30.12	— .03	33.5	+ 8.0	61	15	42	— 3	31	25	34	28	25	79	0.88	— 1.2	4	7,739	nw.	31	nw.	25	9	12	10	5.3	0.1
Hannibal	534	75	110	....	....	....	32.8	+ 6.9	60	22	41	— 2	31	24	30	....	....	....	1.69	+ 0.1	9	7,097	nw.	36	sw.	29	17	5	9	4.4	0.2
St. Louis	567	111	210	29.49	30.12	— .02	37.4	+ 6.9	66	24	45	4	31	30	28	33	29	76	0.65	— 1.5	7	8,331	s.	35	sw.	24	9	11	11	5.8	T.
Missouri Valley.							30.3	+10.1										74	0.44	— 0.6										4.7	
Columbia	783	4	84	....	....	....	34.1	+ 4.1	65	15	44	0	31	24	35	....	....	....	1.46	— 0.4	10	6,904	nw.	38	nw.	24	11	9	11	5.3	T.
Kansas City	963	78	95	29.09	30.16	— .02	34.6	+ 9.2	62	23	43	2	31	26	35	31	25	73	0.17	— 1.0	3	6,449	nw.	31	nw.	24	17	5	9	4.2	T.
Springfield, Mo	1,324	100	108	28.69	30.14	— .01	36.9	+ 4.6	66	14	44	3	29	29	31	33	30	79	1.96	— 0.4	10	7,847	se.	31	nw.	25	9	11	11	5.9	1.1
Topeka	....	81	....	....	....	....	34.1	+ 7.3	63	23	44	1	31	24	41	....	....	....	0.09	— 1.0	3	....	n.	....	....	....	9	13	9	5.0	T.
Lincoln	1,199	75	84	28.80	30.14	— .05	30.7	+13.0	61	18	40	— 6	28	21	38	27	22	73	0.13	— 0.6	1	7,583	s.	42	nw.	24	19	5	7	3.9	T.
Omaha	1,105	115	121	28.90	30.13	— .06	29.6	+10.4	57	22	38	— 8	28	21	36	26	23	79	0.15	— 0.5	2	6,806	nw.	34	nw.	24	15	8	8	4.5	T.
Sioux City	1,139	96	164	....	....	....	26.6	+10.3	60	13	36	—12	28	18	35	....	....	....	0.24	— 0.6	2	9,401	nw.	60	nw.	24	16	9	6	4.1	0.1
Pierre	1,572	11	19	28.37	30.13	— .07	26.9	+14.2	60	13	39	—13	31	15	41	21	12	60	0.04	— 0.5	3	6,787	nw.	56	nw.	24	9	15	7	4.8	0.3
Huron	1,306	56	67	28.65	30.14	— .07	22.0	+15.0	64	19	34	—20	31	10	42	18	15	80	0.07	— 0.4	4	8,634	nw.	46	nw.	24	14	9	8	4.7	0.5
Yankton	1,234	52	58	....	....	....	27.5	+13.3	62	19	38	—12	31	17	38	....	....	....	0.06	— 0.5	4	6,605	nw.	45	nw.	24	12	11	8	4.7	0.8
Northern Slope.							30.2	+13.1										69	0.11	— 0.6										4.4	
Havre	2,494	46	47	27.33	30.08	— .09	27.3	+17.6	61	18	37	—15	28	17	55	24	20	77	0.12	— 0.8	3	8,431	sw.	40	sw.	23	8	22	1	4.8	0.2
Miles City	2,371	42	50	27.49	30.09	— .09	29.4	+18.8	60	19	40	—12	28	19	40	25	23	90	0.13	— 0.4	3	4,699	sw.	48	n.	24	14	12	5	4.0	1.0
Helena	4,108	88	93	25.85	30.18	+ .06	31.0	+13.9	51	13	38	1	1	24	30	27	19	62	0.03	— 1.3	2	5,703	sw.	52	w.	23	7	14	10	5.7	0.8
Kalispell	2,964	45	51	26.97	30.17	....	30.4	....	49	13	37	4	28	24	24	28	24	80	0.84	....	13	3,440	nw.	30	sw.	23	6	8	17	6.6	4.2
Rapid City	3,251	46	50	26.59	30.04	— .13	32.8	+12.6	66	19	44	— 8	28	22	38	27	19	60	0.31	0.0	2	5,645	nw.	46	nw.	24	18	12	1	3.0	3.2
Cheyenne	6,084	56	64	23.99	30.22	+ .05	31.0	+ 6.0	59	19	44	—13	28	18	42	24	11	48	0.15	— 0.2	5	9,338	nw.	48	nw.	10	13	16	2	4.1	1.1
Lander	5,372	28	36	24.66	30.24	+ .08	28.2	+11.4	57	13	42	— 8	28	14	45	22	15	66	T.	— 0.8	0	2,507	sw.	36	sw.	23	14	17	0	3.7	T.
North Platte	2,826	43	52	27.13	30.20	+ .01	31.4	+11.4	63	13	43	— 5	28	19	39	25	20	69	0.06	— 0.4	1	5,309	w.	36	nw.	24	17	13	1	3.7	T.
Middle Slope.							36.8	+ 8.8										68	0.24	— 0.6										3.8	
Denver	5,290	79	151	24.73	30.20	+ .03	36.3	+ 8.1	67	23	49	— 2	28	24	42	29	19	56	0.13	— 0.4	3	6,141	s.	45	nw.	29	20	8	3	3.0	1.9
Pueblo	4,682	80	86	25.32	30.17	— .01	35.2	+ 6.5	70	23	48	6	29	22	48	29	20	59	0.06	— 0.3	2	4,656	nw.	45	w.	24	18	10	3	3.2	0.5
Concordia	1,398	42	47	28.62	30.17	— .02	34.2	+11.0	64	23	44	1	28	24	39	29	25	76	0.53	— 0.3	1	4,495	s.	22	s.	24	15	11	5	3.9	
Dodge	2,504	44	52	27.45	30.16	.00	36.8	+10.2	69	13	50	5	28	23	41	30	24	72	0.17	— 0.3	3	6,132	nw.	32	se.	8	21	8	2	3.5	0.1
Wichita	1,351	78	85	28.67	30.16	.00	37.4	+ 6.8	61	13	46	8	28	28	36	31	25	69	0.10	— 1.0	3	5,856	n.	28	n.	25	13	10	8	4.5	T.
Oklahoma	1,218	54	62	28.81	30.15	.00	41.0	+ 9.9	64	23	50	12	28	32	29	36	32	75	0.46	— 1.4	5	7,389	n.	35	s.	29	15	4	12	4.8	0.3
Southern Slope.							43.8	+ 6.5										70	0.76	0.0										3.8	
Abilene	1,749	45	54	28.26	30.14	— .02	47.3	+ 4.5	76	24	58	17	29	37	38	40	35	69	0.92	0.0	4	6,372	se.	35	nw.	28	11	12	8	4.6	T.
Amarillo	3,691	54	61	26.28	30.14	— .01	40.4	+ 8.5	66	14	51	11	29	30	49	34	29	70	0.59	0.0	4	6,983	n.	36	n.	17	19	5	7	3.0	T.
Southern Plateau.							49.2	+ 6.3										43	0.20	— 0.5										2.9	
El Paso	3,767	10	110	26.22	30.12	+ .03	47.8	+ 8.3	69	24	62	21	29	34	41	37	23	47	0.11	— 0.4	2	6,788	nw.	38	ne.	17	17	9	5	3.6	
Santa Fe	6,998	47	50	23.26	30.14	.00	35.5	+ 7.6	53	24	45	18	29	26	27	27	13	45	0.38	— 0.2	3	4,678	ne.	26	n.	12	20	10	1	2.3	2.8
Flagstaff	6,885	12	25	23.36	30.22	....	34.4	....	58	24	48	12	22	21	41	29	....	....	1.00	....	5	....	e.	....	....	....	11	9	11	....	0.2
Phenix	1,076	47	57	28.87	30.05	— .01	56.1	+ 6.7	75	17	70	34	11	42	37	44	29	41	0.11	— 0.5	2	2,495	e.	18	e.	18	19	7	5	3.5	
Yuma	141	16	50	29.85	30.00	— .05	59.8	+ 5.7	79	30	74	38	1	46	38	47	31	38	0.08	— 0.3	1	4,248	n.	42	n.	9	24	6	1	2.0	
Independence	3,907	51	58	26.07	30.09	— .03	46.6	+ 8.2	67	17	58	29	9	35	31	38	24	45	0.31	— 0.9	4	4,375	nw.	40	n.	8	16	13	2	3.0	
Middle Plateau.							36.1	+ 7.9										68	0.37	— 1.0										4.6	
Carson City	4,720	82	92	25.35	30.19	+ .03	39.4	+ 7.5	60	16	51	18	27	27	38	34	28	66	0.20	— 2.4	2	3,210	sw.	26	sw.	5	15	9	7	4.6	
Winnemucca	4,340	59	70	25.77	30.24	+ .06	36.1	+ 9.1	56	13	46	12	26	26	35	33	28	73	0.71	— 0.4	6	6,572	ne.	37	w.	23	10	10	11	5.2	T.
Cedar City	5,850	36	47	24.32	30.22	....	37.2	....	57	13	46	14	10	28	33	31	21	58	0.81	....	4	3,567	se.	22	n.	17	13	11	7	4.4	6.8
Salt Lake City	4,360	105	110	25.75	30.28	+ .05	35.6	+ 7.7	57	13	43	20	1	29	26	32	20	78	0.44	— 1.0	4	2,509	se.	15	n.	24	14	5	12	5.0	1.8
Grand Junction	4,608	43	50	25.49	30.30	....	33.2	+ 7.3	50	31	43	14	1	24	27	27	20	64	0.14	— 0.4	2	2,666	se.	18	se.	19	18	6	7	3.7	T.
Northern Plateau.							35.5	+10.6										80	1.21	— 1.0										6.4	
Baker City	3,464	49	55	26.55	30.25	+ .06	31.6	+ 8.8	46	6	38	9	28	25	28	29	26	80	0.74	— 0.9	10	4,249	s.	22	s.	1	7	5	19	6.8	2.5
Boise	2,736	61	68	27.32	30.26	+ .03	36.8	+ 9.4	54	6	45	19	28	29	25	33	29	76	1.54	— 0.8	9	2,795	se.	20	nw.	23	9	9	13	6.0	0.8
Pocatello	4,482	48	56	25.60	30.27	+ .04	32.0	+12.9	48	14	39	7	28	25	30	29	26	78	0.44	— 1.6	8	7,734	s.	37	s.	23	13	4	14	6.0	0.6
Spokane	1,943	99	107	28.06	30.17	+ .06	35.8	+11.3	52	12	42	15	28	29	21	33	30	84	1.39	— 1.2	12	3,636	sw.	29	sw.	12	6	2	23	7.6	T.
Walla Walla	1,018	65	73	29.05	30.14	.00	41.2	+10.7	63	6	48	20	28	34	30	39	36	83	1.92	— 0.5	9	4,016	s.	29	sw.	23	7	13	11	5.7	
N. Pac. Coast Reg.							43.1	+ 4.5										87	5.50	— 1.6										6.9	
Neah	50	7	24	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
Port Crescent	256	15	20	....	....	....	40.4	+ 4.9	54	12	46	27	29	34	18	....	....	....	6.38	— 0.7	20	2,455	sw.	30	sw.	8	5	12	14	6.8	
Seattle	119	114	121	29.94	30.07	+ .04	43.8	+ 4.8	60	17	49	31	29	39	15	42	39	84	8.04	— 2.2	21	4,711	se.	34	s.	23	6	9	16	6.8	
Tacoma	213	113	120	29.87	30.11	+ .08	42.2	+ 4.2	61	17	48	25	28	36	20	41	39	90	4.97	— 1.4	24	4,037	s.	36	sw.	23	5	5	21	7.9	T.
Astoria	20	57	64	30.06	30.08	+ .06	44.4	+ 3.9	59	12	50	32	24	39	18	43	....	....	10.35	— 0.4	24	5,201	ne.	32	sw.	23	6	7	18	7.0	
Portland, Oreg	153	203	213	29.94	30.10	+ .01	44.0	+ 5.6	61	17	49	28	27	39	20	42	39	84	4.58	— 2.6	19	6,279	s.	39	s.	5	5	8	18	7.0	
Roseburg	521	56	67	29.52	30.09	— .03	44.0	+ 3.7	60	12	49	30	26	40	27	43	41	89	4.20	— 2.0	19	2,018	e.	27	sw.	22	6	14	11	6.1	
Mid. Pac. C'st Reg.							49.2	+ 2.7										87	4.93	— 0.6										6.7	
Eureka	64	60	69	30.07	30.13	+ .04	50.4	+ 4.1	66	6	56	35	24	45	17	48	46	86	6.63	— 1.8	17	3,079	se.	28	se.	5	8	9	14	6.5	
Mount Tamalpais	2,375	11	18	27.62	30.12	....	47.4	....	61	18	52	36	21	43	19	45	43	86	6.04	....	10	11,301	nw.	64	se.	2	10	9	12	5.8	
Red Bluff	334	54	58	29.78	30.14	+ .01	48.8	+ 3.9	69	17	54	33	26	43	32	46	44	85	4.15	— 0.5	12	3,431	se.	26	n.	24	6	8	17	6.6	
Sacramento	71	106	117	30.06	30.14	+ .02	47.2	+ 1.6	60	6	51	36	26	44	15	46	45	90	3.54	— 0.3	11	4,416	se.	48	se.	2	3	1	27	8.7	
San Francisco	153	161	167	29.97	30.13	+ .02	50.7	+ 0.6	64	17	55	42	22	47	15	49	47	87	4.11	— 0.6	7	5,385	n.	46	se.	2	9	11	11	5.8	
Point Reyes Light	....	12	16	....	....	....	51.8	+ 3.2	65	18	57	41	22	47	21	....	....	....	6.46	+ 0.4	9	10,067	nw.	60	sw.	2	7	4	20	6.9	
S. Pac. Coast Reg.							54.6	+ 4.0										79	1.33	— 1.4										5.5	
Fresno	332	67	70	29.77	30.13	.00	46.7	+ 2.2	64	6	50	34	11	43	20	46	45	94	1.52	+ 0.2	6	2,627	nw.	18	nw.	8	5	1	25	8.4	
Los Angeles	330	74	82	29.69	30.04	— .02	57.7	+ 4.6	81	18	68	41	16	47	34	51	47	75	1.17	— 1.8	2	2,373	w.	23	nw.	8	10	14	7	4.9	
San Diego	87	94	102	29.95	30.05	— .02	57.8	+ 4.2	79	18	64	46	21	52	24	52	48	76	0.69	— 1.3	5	2,701	nw.	20	sw.	3	20	5	6	3.7	
San Luis Obispo	201	10	46	29.88	30.10	+ .01	56.2	+ 5.1	80	18	66	36	11	46	30	50	45	72	2.13	— 2.5	4	3,725	n.	22	n.	10	11	11	9	4.9	
West Indies.																															
Basseterre	29	41	54	29.98	30.01	....	77.1	....	84	3	82	67	15	72	15	71	68	73	1.78	....	20	8,100	e.	27	e.	29	7	23	1	4.6	
Bridgetown	30	57	65	29.92	29.95	....	78.6	....	86	2	84	69	18	73	16	73	71	79	1.90	....	16	6,419	ne.	25	ne.	12	1	23	7	6.0	
Cienfuegos	52	62	67	29.98	30.03	....	69.6	....	83	23	78	50	4	61	25	64	62	85	0.74	....	6	5,306	n.	21	ne.	5	14	10	7	4.5	
Havana	57	83	100	30.00	30.06	....	69.1	....	82	10	75	57	5	64	20	64	62	80	2.24	....	9	7,577	e.	34	ne.	6	7	10	14	6.3	
Kingston	286	38	52	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	
Port of Spain	40	65	66	29.87	29.91	....	78.9	....	89	20	86	69	27	72	18	72	70	76	4.40	....	20	2,444	ne.	14	e.	29	8	18	5	5.3	
Puerto Principe	352	55	62	29.66	30.01	....	70.4	....	86	12	79	55	26	62	26	65	64	91	4.40	....	14	4,870	ne.	23	e.	9	11	8	12	5.9	
Roseau	25	37	47	29.94	29.96	....	77.8	....	86	28	84	69	16	72	15	70	67	72	1.32	....	19	3,990	ne.	26	ne.	16	8	19	4	4.8	
San Juan	82	48	73	29.93	30.01	....	75.6	....	86	1	81	68	15	70	16	71	69	82	3.93	+ 1.0	21	8,194	e.	36	ne.	9	13	18	0	4.0	
Santiago de Cuba	82	45	51	29.90	29.98	....	75.1	....	87	22	83	64	9	68	19	68	67	82	1.08	....	6	3,764	n.	22	nw.	8	9	17	5	5.0	
Santo Domingo	57	37	44	29.97	30.03	....	74.8	....	86	4	82	62	24	67	20	70	69	88	2.36	....	9	4,030	n.	17	n.	10	13	16	2	3.9	
Willemstad	75	39	46	29.84	29.91	....	79.4	....	85	24	84	71	17	75	13	73	71	78	1.12	....	15	7,915	e.	24	e.	10	4	22	5	5.5	

NOTE.—The data at stations having no departures are not used in computing the district averages. Letters of the alphabet denote number of days missing from the record. * Two or more dates. † Received too late to be considered in departures, etc.

TABLE II.—*Climatological record of voluntary and other cooperating observers, January,* 1900.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Alabama.					
Alco	72	17	47.0	4.63	
Ashville	69	12	42.6	2.65	T.
Bermuda	71	16	47.5	3.05	
Birmingham	67	11	46.1	5.20	
Bridgeport	......	......	......	4.25	
Citronelle	69	22	49.6	5.81	
Clanton	68	14	42.9	3.81	2.0
Daphne*	68	20	49.3	3.10	T.
Decatur	66	10	41.6	3.45	T.
Demopolis	......	......	......	3.80	
Eufaula *a*	71	12	43.6	2.53	
Eufaula *c*	......	......	......	2.15	
Eutaw	71	16	45.2	2.09	T.
Florence *a*	......	......	......	3.26	1.5
Florence *b*	67	12	41.6	3.39	1.2
Fort Deposit	69	16	44.7	4.94	
Gadsden	68	10	42.4	3.13	
Goodwater	70	12	40.6	4.08	T.
Greensboro	67	16	44.5	3.19	
Hamilton	66	9	41.8	2.78	
Healing Springs	73	18	47.1	4.63	
Highland Home	69	17	45.2	2.39	T.
Livingston *a*	69	15	44.8	2.42	
Livingston *b*	68c	20c	47.5c	2.79	
Lock No. 4	......	12	......	2.86	T.
Madison Station	66	9	42.3	4.08	
Maplegrove	65	10	39.4	3.23	
Marion	71	20	46.4	3.40	T.
Mount Willing	71	16	47.0	4.95	
Newbern	72	15	45.4	3.51	T.
Newburg	65	10	41.5	3.52	
Newton	64	13	43.6	2.55	
Oneonta	64	9	41.5	4.59	T.
Opelika	74	12	44.9	3.52	T.
Oxanna	61	13	40.4	3.95	0.5
Prattville	73	14	45.6	......	
Pushmataha	69	17	46.0	3.22	T.
Riverton	66	9	39.7	2.42	
Rockmills	70	10	44.8	2.60	
Scottsboro	64f	8	40.7f	4.44	T.
Selma	69	17	46.2	2.54	T.
Tallassee	......	......	......	0.78	0.4
Thomasville f	67	25	50.4	4.21	
Tuscaloosa	67	15	42.6	3.58	
Tuskegee	71	14	44.8	1.77	
Union Springs	70	14	44.2	2.75	1.5
Uniontown	69	18	46.6	3.55	
Valleyhead	64	6	40.4	4.26	
Warrior	......	......	......	2.14	
Wetumpka	70	16	44.0	3.12	
Arizona.					
Allaire Ranch	......	......	......	0.22	
Arizona Canal Co. Dam	79	31	56.2	0.27	
Aztec *[1]	75	42	57.0	0.05	
Benson *[1]	68	31	51.0	0.35	
Bisbee	70	29	48.8	0.54	
Blaisdell *[1]	80	37	59.6	T.	
Bowie *[1]	62	30	42.1	0.00	
Buckeye	80	28	54.4	0.30	
Camp Creek	72	37	54.7	0.12	
Casagrande *[1]	73	39	54.3	0.20	
Champie Camp	81	35	58.2	0.40	
Cochise	......	......	......	0.00	
Congress	70	43	56.8	0.57	
Dragoon Summit	62	30	43.2	1.10	T.
Dudleyville	71	24	50.6	0.46	
Fort Apache	68	17	39.9	0.30	
Fort Defiance	57	8	33.8	T.	T.
Fort Grant	80	32	52.6	0.31	
Fort Huachuca	70	29	48.6	0.45	
Fort Mohave	......	38	......	0.04	
Gilabend *[1]	72	38	53.2	0.00	
Holbrook	62	12	37.6	0.04	
Ingleside	75	30	54.6	0.11	
Jerome	62	35	48.5	0.20	
Maricopa *[1]	75	31	55.3	0.00	
Mesa	76	31	54.6	0.08	
Mount Huachuca	65	27	46.8	0.17	
Music Mountain	68	22	48.2	0.16	
Natural Bridge	......	......	......	0.20	
Nogales *	77	25	49.6	0.21	
Oracle	66	32	49.3	0.16	
Oro	......	......	......	0.32	
Pantano *[1]	82	38	50.3	0.55	
Peoria	76	35	56.4	0.09	
Phenix	75	28	52.8	0.10	
Pima	79	18	48.5	0.15	
Pinal Ranch	......	......	......	0.13	
Prescott	65	16	40.8	0.88	5.8
Russellville	......	......	......	0.44	
San Carlos	74	......	......	0.15	
San Simon *[1]	58	25	39.6	0.15	
Sentinel *[1]	77	41	56.5	0.00	
Signal	79	26	53.6	0.32	
Silverking	......	......	......	0.40	
Snowflake	68	10	36.0	0.14	......

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Arizona—Cont'd.					
Strawberry	57	15	38.3	0.14	T.
Supai	65	30	48.2	0.07	
Texas Hill *[1]	80	31	55.0	0.00	
Tonto	71	19	48.0	0.17	
Tuba	68	22	43.2	0.15	
Tucson	76	27	52.9	0.16	
Vail *[5]	74	42	55.8	0.06	
Willcox *[1]	70	22	42.2	0.18	
Winslow	68	17	38.0	0.06	0.6
Yarnell	......	......	......	0.88	
Arkansas.					
Amity	69	12	44.3	4.02	T.
Arkadelphia	72	12	46.5	3.17	T.
Arkansas City	......	......	......	1.83	
Batesville	75	9	43.7	2.69	
Beebranch	78s	7s	41.1s	2.95	T.
Blanchard Springs	72	11	45.9	3.15	T.
Brinkley	71	12	47.4	2.20	T.
Camden *a*	......	......	......	2.83	T.
Camden *b*	72	12	45.2	2.19	
Canton	69	5	39.5	1.93	0.2
Conway	76	10	45.4	4.04	T.
Corning	73	9	38.7	2.18	0.5
Dallas	68	10	44.0	3.88	0.2
Dardanelle	......	......	......	2.79	
Elon	73	12j	45.4e	3.44	T.
Fayetteville	69	5	40.8	1.46	1.0
Forrest	72	12	44.0	......	......
Fulton	......	......	......	3.42	1.0
Hardy	68	7	40.5	1.80	0.4
Helena *a*	......	......	......	2.66	
Helena *b*	70	15	45.2	2.64	T.
Hot Springs *b*	......	......	......	4.00	4.0
Jonesboro	70	11	43.6	5.59	0.9
Keesees Ferry	70	5	41.4	2.48	0.5
Lacrosse	68	6	43.6	......	
Lonoke	68	12	45.5	2.55	T.
Luna Landing	75	14	46.4	1.88	
Lutherville	70	9	42.4	2.91	T.
Malvern	71	13	44.9	3.38	T.
Marvell	71	12	44.6	2.71	
Mossville	64	7	35.1	2.82	
Mount Nebo	66	7	40.2	2.80	1.0
New Gascony	70	11	45.4	2.40	T.
Newport *a*	......	......	......	2.68	0.5
Newport *b*	70	11	43.6	2.73	T.
Newport *c*	72	10	43.2	2.74	T.
Oregon	72	4	42.6	1.93	T.
Osceola	75	9	43.6	2.60	T.
Ozark	73	11	43.6	2.57	1.0
Pinebluff	73	12	46.0	2.20	
Pocahontas	65	8	39.8	1.89	0.8
Pond	66	1	39.0	1.59	1.0
Powell	72	3	38.6	0.84	T.
Rison	74	11	47.0	2.25	
Russellville	70	15	43.2	1.80	T.
Silversprings	71	5	40.8	1.58	1.5
Spielerville	74	10	43.6	3.63	T.
Stamps *e*	67	12	43.3	1.98	T.
Stuttgart	73	13	44.8	1.95	T.
Texarkana	76	10	47.6	3.60	
Warren	72	12	43.4	3.17	
Washington	78	12	46.2	3.52	0.3
Wiggs	68	8	43.5	4.06	T.
Winslow	65	5	38.2	4.10	3.2
Witts Springs	67	3	40.8	1.26	0.5
California.					
Agnew	68	33	52.7	2.66	
Anada	63	23	44.4	9.05	
Angiola	68	30	46.0	0.94	
Bakersfield	70	28	48.2	0.84	
Ballast Point L. H.	......	......	......	0.50	
Bear Valley	......	......	......	7.42	
Berkeley	60	39	49.9	4.18	
Bishop	70	20	45.3	0.49	
Boca *[1]	56	8	25.3	1.57	
Bodie	49	−12	22.0	0.61	12.0
Bowman *[1]	68	22	39.0	9.60	4.0
Cahto	......	......	......	5.38	
Caliente *[1]	65	34	51.2	0.50	
Campbell	64	31	49.4	2.56	
Cape Mendocino L. H	......	......	......	7.60	
Cedarville	59	18	37.0	0.83	T.
Chico *[1]	65	34	51.0	3.79	
Cisco *[1]	48	20	35.1	8.40	27.0
Claremont	75	34	52.2	1.50	
Corning *[1]	59	36	48.8	4.61	
Coronado	72	49	58.0	......	
Craftonville	81	36	57.0	1.15	
Crescent City	64	32	49.6	10.75	
Crescent City L. H	......	......	......	10.63	
Cuyamaca	58	22	40.3	3.62	
Delano *[5]	65	33	46.4	0.69	
Delta *[1]	70	32	50.0	12.25	
Deweyville	66	30	45.6	0.83	
Drytown	68	33	48.5	1.83	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
California—Cont'd.					
Dunnigan *[1]	63	35	47.8	4.15	
Durham *[1]	61	34	48.0	4.80	
East Brother L. H	......	......	......	2.80	
Edmanton *[1]	60	25	39.6	10.99	
Elcajon	81	33	55.8	1.33	
Elmwood	64	31	46.8	1.15	
Elsinore	82	31	54.6	1.56	
Escondido	74	28	50.9	5.18	
Fallbrook *[1]	79	36	53.6	3.26	
Folsom City	......	......	....	5.63	23.0
Fort Bragg	......	......	......	3.44	
Fort Ross	67	39	52.0	8.44	
Fort Tejon	......	......	......	2.12	
Georgetown	69	32	48.4	5.07	
Gilroy Hot Springs	......	......	......	3.80	
Gilroy (near)	72	30	51.0	2.18	
Glendora	......	......	......	1.47	
Grand Island *[5]	62	36	50.2	3.23	
Grass Valley	......	......	......	7.45	
Greenville	61	18	40.1	5.51	4.0
Hanford	66	30	46.0	1.38	
Healdsburg	67	33	50.0	5.70	
Hill Ranch	74	34	53.6	2.17	
Hollister	69	30	50.3	0.90	
Humboldt L. H	......	......	......	5.90	
Indio *[1]	86	40	57.7	1.00	
Iowa Hill *[1]	68	38	49.8	4.43	
Irvine	90	44	63.4	2.19	
Jackson	58	28	42.4	2.37	
Jolon	......	......	......	3.03	
Kennedy Gold Mine	59	28	42.2	2.90	
Kernville	......	......	......	0.80	
King City *[1]	68	32	47.9	1.89	
Kono Tayee	61	37	48.5	3.10	
Lagrange *[5]	64	36	47.5	1.71	
Lakeside	......	......	......	2.94	
Lamesa	......	......	......	0.97	
Lankershim	66	32	46.2	1.40	
Laporte *[1]	55	25	38.3	11.95	18.0
Las Fuentes Ranch	......	......	......	2.65	
Legrand	......	33	......	1.42	
Lemoncove	68	33	48.0	1.38	
Lemoore *a* *[1]	62	31	46.3	1.96	
Lick Observatory	63	30	47.5	3.26	
Lime Point L. H	......	......	......	3.83	
Lodi	61	35	49.2	2.92	
Los Gatos *b*	61	36	48.5	5.40	
Mammoth *[1]	79	41	58.2	0.15	
Manzana	68	35	52.4	1.11	
Mare Island L. H	......	......	......	2.80	
Merced *b*	62	32	46.2	1.63	
Mills College	......	......	......	4.09	
Milo	......	......	......	1.65	
Milton (near) *[1]	64	37	46.7	1.57	
Modesto *[1]	67	36	50.2	1.80	
Mohave *[1]	66	35	49.1	0.31	
Mokelumne Hill *[3]	......	31	43.6	2.44	
Monterio	76	38	57.6	1.51	
Monterey *[1]	64	39	52.6	1.34	
Morena Dam	67	26	48.1	4.37	
Mountainview	......	......	......	3.05	
Mutah Flat	......	......	......	2.80	
Napa *b*	65	33	49.6	2.84	
Needles	72	40	57.7	0.02	
Nevada City	70	29	45.8	7.81	
Niles	70	43	54.9	3.49	
North Bloomfield	69	32	48.3	9.32	
North Ontario	74	40	54.5	1.75	
North San Juan *[1]	69	28	45.8	6.36	
Oakland *a*	62	39	49.8	4.81	
Oleta *[1]	63	32	44.6	2.33	
Orland *[1]	60	35	46.8	2.53	
Palermo	60	33	48.2	5.80	
Paso Robles *b*	69	28	49.8	2.11	
Peachland *[5]	65	38	50.8	7.88	
Piedras Blancas L. H	......	......	......	3.79	
Pigeon Point L. H	......	......	......	3.90	
Pilot Creek	......	......	......	5.34	
Pine Crest	79	46	59.1	3.72	
Placerville	62	27	43.8	3.92	
Point Ano Nuevo L. H	......	......	......	4.77	
Point Arena L. H	......	......	......	4.04	
Point Bonita L. H	......	......	......	4.66	
Point Conception L. H	......	......	......	2.56	
Point Firmin L. H	......	......	......	1.15	
Point George L. H	......	......	......	6.84	
Point Hueneme L. H	......	......	......	3.51	
Point Lobos	60	42	49.8	4.57	
Point Loma L. H	......	......	......	0.20	
Point Montara L. H	......	......	......	7.10	
Point Pinos L. H	......	......	......	2.19	
Point Sur L. H	......	......	......	2.99	
Pomona (near)	80	34	55.6	1.30	
Poway *[3]	78	36	50.2	3.89	
Quincy	54	23	39.8	6.71	3.0
Ranch House	80	42	58.3	1.64	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Raymond	65	30	45.8	1.65	
Redding	70	30	49.8	6.45	
Redlands	80	38	56.8	1.20	
Reedly	67	31	46.2	1.66	
Represa	62	36	49.0	5.00	
Riovista	.....	.....	.....	3.02	
Riverside	80	38	56.9	1.01	
Roe Island L. H				2.35	
Romie	80	31	52.8	1.51	
Rosewood	68	26	46.8	2.98	
Sacramento *a*	61	35	48.4	3.93	
Salinas *1	78	42	60.4	0.67	
Salton *5	78	44	66.0	0.00	
San Bernardino	82	31	55.8	0.92	
San Jacinto	74	32	52.0	1.42	
San Leandro *1	74	41	55.0	3.93	
San Luis L. H				1.53	
San Mateo *1	64	39	52.2	5.55	
San Miguel *1	68	27	50.8	1.69	
Santa Barbara *a*	79	44	57.5	2.32	
Santa Barbara L. H				2.55	
Santa Clara *a*				2.54	
Santa Cruz *b*	76	34	53.0	5.49	
Santa Cruz L. H				5.42	
Santa Maria	80	38	58.4	0.87	
Santa Monica *1	72	43	55.8	2.70	
Santa Rosa *1	63	35	50.0	4.98	
Shasta	66	35	49.4	6.69	
Sierra Madre	75	41	56.6	1.26	
Snedden				1.40	
Sonoma				4.68	
S. E. Farallone L. H				3.27	
Stanford University	62	35	49.8	.....	
Stockton *a*	64	34	47.2	2.39	
Summerdale	59	26	42.0	7.05	
Susanville	58	20	36.0	1.30	8.0
Tehama *1	68	37	51.0	3.59	
Tejon Ranch	67	32	48.2	1.17	
Templeton *1	65	35	48.0	0.10	
Thermalito	65	30	48.1	5.48	
Truckee *1	51	12	30.6	2.63	6.0
Tulare *b*				1.28	
Tulare *c*	70	30	47.2	1.02	
Ukiah	68	28	50.2	4.55	
Upper Mattole *1	70	30	49.3	12.27	
Vacaville *a**1	65	36	48.5	3.82	
Ventura	80	38	55.6	1.90	
Visalia *b*	66	30	46.2	1.24	
Volcano Springs *1	83	39	55.2	0.55	
West Palmdale				0.65	
Westpoint				3.59	
West Saticoy				2.25	
Wheatland	60	33	47.0	4.67	
Williams *1	68	40	52.0	2.24	
Wilmington *1	75	43	55.1	1.50	
Wire Bridge *5	62	32	48.3	5.22	
Yreka	55	23	39.8	1.35	
Yuba City *5	64	34	56.0	5.20	
Colorado.					
Antlers	47	11	29.4	0.23	0.7
Arkins				0.19	2.2
Aspen				0.70	14.0
Boulder	63	1	37.0	0.40	4.5
Boxelder				0.18	1.0
Breckenridge	38	−12	16.2	0.85	7.8
Buenavista				0.05	1.0
Canyon	66	− 6	38.9	0.14	0.5
Castlerock	58	− 9	29.8	0.10	2.0
Cedaredge	54	12	32.3	0.36	3.2
Cheyenne Wells	62	− 6	34.6	0.03	0.5
Clearview *1	44	4	24.3	0.48	9.5
Colorado Springs	62	− 2	33.2	0.05	1.0
Cope	60	− 4	33.2	0.12	2.0
Cripplecreek	50	− 6	27.2	0.06	1.0
Crook	68	− 9	32.4	T.	T.
Delta	56	5	32.4	0.26	2.0
Dumont				0.09	2.0
Durango	54	10	32.9	0.29	3.3
Fairview	57	− 6	28.0	0.01	0.5
Fort Collins	66	− 6	31.0	0.25	3.1
Fox				0.05	0.8
Garnett	49	− 8	22.8	0.00	
Georgetown	49	4	29.8		
Gilman				0.67	15.5
Gleneyrie	59	1	33.0	0.27	4.2
Glenwood				0.73	9.0
Greeley	60	− 3	31.6	0.16	1.0
Gunnison	42	−23	7.2	0.30	2.5
Gypsum				0.32	5.2
Hamps	60	−10	31.6	0.09	1.2
Hoehne	65	4	34.5	0.01	0.5
Holly				T.	T.
Holyoke (near)	70	− 8	32.4	0.02	0.5
Hugo				T.	T.
Husted	61	−16	30.6	0.31	4.5
Lake Moraine	50	− 8	23.4	0.34	8.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lamar	72	2	37.8	T.	0.5
Laporte				0.34	5.0
Las Animas	74	4	35.1	0.00	
Lay	47	−12	21.2	0.40	4.0
Leadville (near) *1	42	0	21.2	0.60	13.0
Leroy	63	−10	33.1	0.10	1.3
Longs Peak	53	−12	25.8	0.16	3.5
Mancos	58	8	33.2	0.40	2.0
Marshall Pass				0.90	18.0
Meeker	61	− 1	25.4	0.54	0.8
Minneapolis	70	− 1	38.0	0.17	2.5
Mitchell				0.71	15.0
Montrose				0.05	0.0
Moraine	52	− 6	27.3	0.21	4.2
Pagoda	48	− 6	22.8	0.30	3.0
Palmer				0.22	4.0
Parachute	48	14	30.8	0.29	.....
Perrypark				T.	T.
Rangely	42	−16	16.8	0.15	0.8
Rockyford	67	2	34.5	T.	T.
Ruby				1.73	29.0
Saguache	46	0	26.3	0.02	0.5
Salida	62	6	33.4	0.05	1.0
San Luis	55	0	28.6	0.31	1.5
Santa Clara *1	55	10	30.6	0.48	9.5
Sapinero				0.31	5.2
Sargents				0.35	7.0
Seibert				T.	T.
Springfield				0.05	1.0
Strickler Tunnel				0.19	4.8
Trinidad	71	4	39.0	T.	T.
Troutvale	44	−22	13.8	0.13	1.5
T. S. Ranch	47	−15	31.7	0.15	
Twinlakes				T.	T.
Vilas				0.00	
Wagon Wheel	46	−11	17.0	0.12	2.5
Walden	50	−20	15.7	0.21	3.0
Wallet				0.05	1.0
Westcliffe	56	− 5	28.6	0.10	2.0
Wray	68	− 5	34.2	0.16	2.0
Yuma				0.14	2.5
Connecticut.					
Bridgeport	57	1	29.7	4.37	3.6
Canton	56	− 4	25.8	3.52	10.0
Colchester	58	− 2	29.0	4.26	6.5
Falls Village				2.72	9.8
Greenfield Hill				4.27	6.0
Hartford *b*	52	2	28.2	3.14	6.5
Hawleyville	56	0	29.4	3.68	.....
Lake Konomoc				5.02	.....
Middletown	57	− 7	28.6	4.19	5.0
New London	55	6	29.6	4.25	4.8
North Grosvenor Dale	58	− 8	26.2	5.04	.....
Norwalk	56	− 2	29.0	4.11	4.5
Southington	53	−10	28.2	3.35	7.3
Storrs	56	2	26.8	3.42	6.1
Voluntown	62	− 4	29.2	4.80	6.0
Wallingford				4.59	5.5
Waterbury	55	− 6	27.6	3.77	8.0
West Cornwall	54	1	26.0	2.82	9.0
West Simsbury				3.06	10.5
Winsted *1	54	− 3	24.7	.....	
Delaware.					
Milford				3.69	.....
Millsboro	62	8	34.9	3.07	2.5
Newark	57	6	32.0	3.45	1.5
Seaford	60	12	36.1	3.79	T.
Wyoming	60	8	34.1	2.70	.....
District of Columbia.					
Distributing Reservoir *5	59	12	34.7	1.59	.....
Receiving Reservoir *5	59	12	34.6	1.83	.....
West Washington	65	6	34.2	1.93	1.9
Florida.					
Archer	80	17	54.1	3.58	
Bartow	79	27	58.4	4.72	
Brooksville	77	21	55.2	3.01	
Carrabelle	75	24	52.7	3.73	
Clermont	81	30	56.9	2.33	
Dalkeith	75	17	50.8	2.88	
De Funiak Springs	73	15	49.1	2.31	
Deland	81	25	56.8	.....	
Ernestville	79	22	56.8	4.45	
Estero *1	79	38	60.7	.....	
Eustis	81	23	57.3	2.75	
Federal Point	75	23	53.4	3.99	
Fort Meade	80	26	59.5	5.25	
Gainesville	77	21	52.6	3.98	
Homeland	75	29	55.6	.....	
Huntington	74	24	53.4	2.35	
Hypoluxo	81	37	65.8	4.29	
Jasper	74	18	50.9	2.41	
Kissimmee	80	27	59.7	4.82	
Lake City	79	17	53.2	2.66	
Lemon City	80	38	64.0	5.25	
Macclenny	81	15	51.8	2.66	
Manatee	77	28	57.4	3.36	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Merritt Island	75	32	59.6	4.85	
Middleburg	81	20	52.1	2.48	
Myers	81	36	61.2	3.17	
New Smyrna	80	26	58.1	2.90	
Nocatee	84	31	62.5	2.70	
Ocala	81	17	55.4	3.67	
Orange City	80	25	57.4	2.99	
Orlando	77	27	57.6	3.32	
Plant City	80	25	57.8	4.39	
Rockwell	78*e*	20*e*	55.2*e*	2.68	
St. Andrews	72	23	50.0	2.13	
St. Francis	78	20	55.2	2.49	
St Francis Barracks	76	24	52.5	2.97	
Sebastian	78	34	59.7	4.95	
Stephensville *1	74	13	51.6	4.08	
Switzerland *1	74	24	51.0	2.77	
Tallahassee	73	20	49.4	2.39	
Tarpon Springs	77	25	56.0	3.12	
Wausau	71	15	47.6	0.44	
Georgia.					
Adairsville	64	9	39.4	3.47	
Albany	68	18	46.2	3.22	
Allentown	66	12	44.4	2.42	
Americus	68	13	44.3	2.71	
Athens *b*	65	11	40.8	2.10	
Blakely	68	18	47.6	2.52	
Canton				3.41	
Carlton				1.47	
Cedartown	66	10	40.3	2.60	
Clayton	63	7	36.1	5.64	T.
Columbus	65	18*g*	44.2*d*	1.95	
Covington	71	10	43.2	2.35	
Dahlonega	67	5	39.4	3.42	T.
Diamond	62	6	38.0	4.01	T.
Dublin				3.07	
Elberton	68	10	44.9	2.13	
Fitzgerald	69	15	46.8	3.59	
Fleming	71	15	48.0	3.90	
Forsyth				1.81	
Fort Gaines	70	18	45.8	1.91	
Franklin	65	16	44.8	2.97	
Gainesville	65	10	41.0	2.97	
Gillsville	69	6	42.4	3.42	
Greenbush	64	8	39.6	4.75	T.
Harrison	66	12	44.0	1.90	
Hawkinsville	67	10	44.0	2.94	
Jesup	75	15	49.8	5.08	
Louisville	68	13	44.8	1.93	3.0
Lumpkin	69	15	47.1	2.42	
Marshallville	67	14	46.2	2.51	
Mauzy	74*j*	15*j*	48.4*j*	4.64	
Morgan	71	15	46.2	3.04	
Newnan				2.28	
Oakdale				2.52	
Pelham				3.43	
Piscola	70	18	50.2	2.35	
Point Peter	64	10	39.6	1.85	
Poulan	73	15	46.4	3.70	
Putnam	67	12	44.6	2.19	
Quitman	72	14	48.0	2.19	
Ramsey	67	7	42.2	4.15	T.
Resaca				3.85	
Reynolds				2.34	0.2
Rome	65	12	40.3	3.52	T.
Talbotton	68	12	44.0	2.26	T.
Thomasville	73	19	49.9	3.62	
Toccoa				3.58	
Valona	61*e*	18	42.6	3.27	
Washington				2.70	0.5
Waycross	70	18	48.2	4.60	
Westpoint				3.03	1.5
Idaho.					
Albion	53	11	35.2	0.60	
American Falls	52	5	33.8	0.35	
Atlanta	45	− 1	25.4	2.76	6.8
Blackfoot	46	0	27.7	0.52	T.
Burnside	46	− 5	23.9	0.05	T.
Challis	54	− 5	24.4	0.30	3.0
Chesterfield	42	−18	21.2	1.78	1.0
Downey	45	6	31.2	0.04	.....
Fort Sherman	52	10	33.6	2.33	.....
Garnet	57	18	39.5	0.88	
Gray	46	−10	24.0	0.65	6.0
Hagerman	59	13	37.8	1.03	
Idaho City	47*e*	0*e*	29.1*e*	1.48	6.8
Kootenai	45	9	30.0	8.45	2.0
Lake	48	− 8	25.6	0.30	3.0
Lakeview	52	17	35.0	3.19	4.5
Lewiston	56	22	41.4	1.84	0.0
Lost River	40	−15	18.4	0.60	6.0
Marysville	47	−14	22.7	0.62	2.5
Moscow	51	16	34.5	3.57	1.5
Murray	49	8	30.8	4.09	13.0
Oakley	63	6	35.6	T.	T.
Ola	45	9	31.8	1.89	3.8
Paris	48	2	26.2	0.40	.....

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Idaho—Cont'd.					
Payette	50	16	36.2	1.13	0.5
Pollock	55	11	37.8	0.48	
Priest River	47	9	31.4	3.04	6.8
St. Maries	49	12	34.1	3.35	2.0
Soldier	46	− 8	21.8	1.31	5.8
Swan Valley	44	− 4	25.4	0.75	5.5
Weston	46	− 4	30.0	0.32	1.0
Yellowjacket	.....	.....	.....	1.92	8.2
Illinois.					
Albion	69	1	35.2	1.80	0.8
Alexander	64	− 6	33.4	1.10	T.
Ashton	51	− 8	27.2	1.34	2.0
Astoria	57	− 5	31.3	2.00	T.
Aurora *a*	56	− 7	28.4	1.68	1.3
Aurora *b*	56	− 7	28.1	1.78	2.1
Bloomington	60	− 6	31.1	1.23	
Bushnell	57	− 6	30.0	2.20	
Cambridge	53	− 8	28.0	1.65	1.2
Carlinville	65	− 3	34.0	0.61	
Carlyle	.....	.....	.....	0.56	.....
Centralia	63	4	36.4	0.75	T.
Charleston	64	− 3	33.0	0.45	
Chemung	48	−10	24.8	1.49	4.5
Chester	.....	.....	.....	1.01	T.
Cisne	64	3	36.0	0.93	T.
Coatsburg	52	− 5	30.8	2.25	
Cobden	68	3	38.0	1.70	T.
Danville	61	− 4	30.9	0.48	T.
Decatur	62	− 5	33.0	0.50	T.
Dixon	52	− 8	28.0	2.06	2.2
Dwight	58	− 7	28.8	1.76	1.0
Effingham	63	0	34.1	0.55	
Elgin	53	− 9	27.0	1.77	1.3
Equality	65	3	38.8	2.41	1.0
Flora	64	0	35.8	0.76	T.
Fort Sheridan	53	− 9	27.0	1.68	1.2
Friendgrove*[1]	64	6	38.0	1.91	T.
Galva	54	− 9	28.2	1.71	2.3
Glenwood*[1]	52	−10	26.4	1.38	T.
Grafton	.....	.....	.....	0.76	
Grayville	62	6	36.8	1.78	0.1
Greenville	66	0	35.5	1.41	
Griggsville	58	− 3	31.5	1.78	T.
Halfway	63	4	37.8	1.71	1.0
Halliday	70	4	35.7	1.38	.....
Havana	57	− 2	31.4	1.88	T.
Henry	59	− 7	30.0	1.82	2.5
Hillsboro	61	− 2	33.2	0.52	T.
Joliet	50	− 6	28.4	1.58	0.9
Knoxville	55	−10	27.3	1.95	1.5
Lagrange	57	− 7	28.4	1.30	T.
Laharpe	56	− 5	30.3	2.15	T.
Lanark	47	−10	25.8	1.48	2.0
Loami	.....	.....	.....	0.42	T.
McLeansboro	65	4	36.0	1.24	0.5
Martinsville	60	− 1	31.6	0.23	T.
Martinton	60	− 7	30.3	0.74	T.
Mascoutah	65	− 2	34.5	0.40	.....
Mattoon	66	0	36.1	0.51	T.
Minonk	57	− 8	29.1	1.30	0.3
Monmouth	55	− 9	28.4	1.67	1.2
Monticello*[3]	62	− 5	31.6	0.40	T.
Morgan Park	.....	−11	.....	1.41	0.5
Morrisonville	62	− 8	33.2	0.43	
Mount Carmel	.....	.....	.....	2.01	0.8
Mount Pulaski	61	− 5	32.7	0.31	T.
Mount Vernon	61	3	32.4	1.08	1.0
New Burnside	65	2	38.5	1.84	T.
Olney	63	3	35.5	0.93	0.1
Ottawa	58	− 6	30.2	1.60	0.8
Palestine	60	0	32.2	1.95	1.0
Pana	63	− 3	33.1	0.51	T.
Paris	61	− 1	31.0	0.80	
Peoria *a*	.....	.....	.....	2.11	0.2
Peoria *b*	58	− 6	31.4	1.92	T.
Philo	61	− 4	31.6	0.16	T.
Plumhill	65	3	37.1	0.46	
Rantoul	62	− 6	30.8	0.18	0.3
Raum	71	1	38.6	2.17	0.5
Riley	49	−10	26.0	1.48	1.8
Robinson	65	0	33.7	0.45	T.
Roundgrove	.....	−10	.....	1.31	2.5
Rushville	57	− 5	30.6	2.10	T.
St. Charles*[1]	52	− 8	26.0	2.12	1.0
St. John	70	4	35.9	1.98	T.
Scales Mound	47	−12	25.0	1.14	2.4
Shobonier	71	1	35.6	0.75	T.
Strawn	58	− 7	30.7	0.95	
Streator	58	− 9	30.0	1.49	0.8
Sullivan	63	− 3	32.5	0.42	
Sycamore	50	− 9	26.2	1.63	3.0
Tilden	64	4	36.4	0.63	T.
Tiskilwa	51	− 9	27.8	1.88	0.5
Tuscola	60	− 4	30.8	0.29	T.
Walnut	53	− 8	28.8	1.50	1.2
Wheaton*[3]	54	− 7	28.5	1.43	1.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Illinois—Cont'd.					
Winchester	60	− 2	32.2	0.94	
Winnebago	50	−10	26.2	2.20	3.0
Indiana.					
Anderson	60	− 4	32.5	1.26	0.5
Angola	53	− 7	27.3	1.37	2.4
Auburn	56	− 6	29.8	0.76	T.
Bedford	68	− 4	30.7	3.13	1.0
Bloomington	60	− 1	34.2	2.25	T.
Bluffton	59	− 6	31.2	0.83	0.5
Boonville	62	− 2	34.1	1.90	T.
Butlerville	61	− 3	33.9	3.43	1.6
Cambridge City	58	− 4	31.9	2.50	1.4
Columbus	62	− 2	33.0	2.55	0.8
Connersville	62	− 2	32.1	2.28	0.4
Culver	58	− 5	32.4	0.03	T.
Delphi	62	− 5	29.5	0.46	0.5
Fairmount	58	− 6	31.0	0.90	T.
Farmland	58	− 3	32.1	2.42	2.9
Fort Wayne	60	− 7	29.8	0.86	T.
Franklin*[1]	62	2	34.0	1.97	0.4
Greencastle	59	− 3	31.6	0.67	1.9
Greensburg	61	− 4	33.9	1.73	T.
Hammond	49	− 8	28.0	1.75	T.
Hector	57	− 7	31.0	1.01	1.0
Huntington	59	− 5	30.0	0.96	2.0
Jasper	.....	.....	.....	3.02	0.1
Jeffersonville	61	5	36.8	3.13	0.7
Knightstown	58	− 3	31.4	2.37	2.0
Kokomo	60	− 4	31.9	0.51	0.6
Lafayette	60	− 7	31.5	0.37	T.
Laporte	59	− 4	30.3	1.11	4.1
Logansport	59	− 5	30.0	0.78	.....
Madison *a*	64	− 1	36.1	3.42	2.0
Madison *b*	.....	.....	.....	2.62	1.0
Marengo	63	− 1	36.1	4.06	0.8
Marion	60	− 6	32.0	0.88	0.8
Markle	59	− 7	30.8	0.50	1.0
Mauzy	60	− 3	32.2	2.57	2.0
Mount Vernon	67	5	38.4	1.86	0.5
Northfield	59	− 5	31.9	1.13	1.0
Paoli	61	− 1	34.8	2.92	1.5
Peru	62	− 6	33.6	0.91	0.1
Richmond	58	− 1	32.2	2.51	T.
Rockport	65	− 5	40.4	3.12	0.3
Rockville	62	− 3	32.8	0.45	T.
Salem	59	− 2	33.6	2.75	1.2
Scottsburg	63	2	36.0	3.30	T.
Seymour	63	0	34.2	2.66	1.0
Shelbyville	60	0	32.6	1.84	.....
South Bend	51	− 5	29.1	0.87	4.0
Syracuse	58	− 7	28.2	0.79	0.9
Terre Haute	65	1	33.6	0.74	T.
Topeka	58	− 3	28.8	0.79	4.0
Valparaiso	50	− 8	31.0	T.	T.
Veedersburg	.....	− 4	.....	0.43	0.2
Vevay	65	2	34.4	4.20	4.0
Vincennes	67	− 2	35.3	1.63	T.
Winamac	59	0	30.0	0.07	0.2
Worthington	63	− 2	32.8	1.41	0.2
Indian Territory.					
Hartshorne	72	10	45.0	1.08	T.
Healdton	72	9	43.2	1.15	T.
Lehigh	73	12	44.0	1.72	T.
Muscogee	68	6	41.2	0.60	T.
Ryan	73	14	45.0	0.60	T.
Sapulpa	68	5	41.7	0.45	1.0
South McAlester	.....	.....	.....	1.14	T.
Tahlequah	68	2	41.1	1.74	0.4
Tulsa	.....	.....	.....	0.47	
Wagoner	69	3	40.3	1.26	0.2
Webbers Falls	.....	.....	.....	1.01	0.1
Iowa.					
Afton	51	−11	27.4	0.23	
Albia	54	−10	28.8	0.34	T.
Algona*[1]	51	−18	22.7	0.63	6.2
Alta *a*	56	−15	23.8	0.45	2.0
Amana	49	−10	26.9	0.72	0.5
Ames *b*	54*c*	−11	26.4	0.38	0.5
Ames (near)	.....	.....	.....	0.28	0.8
Atlantic	53	−10	27.2	0.40	0.5
Audubon	52	−12	26.0	0.37	1.0
Bancroft	53	−16	23.1	0.50	5.0
Batavia	.....	.....	.....	0.06	T.
Baxter	53	−12	24.2	0.26	1.0
Bedford	55	−10	28.6	0.32	.....
Belknap	57	− 8	28.1	0.80	1.0
Bonaparte	55	− 6	29.8	1.54	
Britt	45	−15	22.1	0.63	5.0
Buckingham	.....	.....	.....	0.42	0.5
Burlington	61	− 4	33.2	1.68	.....
Bussey	.....	.....	.....	0.38	T.
Carroll	50	−14	24.0	0.18	0.5
Carson	.....	.....	.....	0.79	0.2
Cedar Rapids	53	−10	28.4	0.61	.....
Centerville	55	− 8	29.5	0.30	.....
Chariton	55	−10	28.4	0.15	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Iowa—Cont'd.					
Charles City	43	−14	22.4	0.58	3.0
Chillicothe	.....	.....	.....	0.72	.....
Clarinda	57	− 8	28.4	0.49	T.
Clearlake	45	−17	21.8	0.55	5.5
Clinton	51	− 8	27.0	1.31	1.2
College Springs	53	− 8	29.0	0.22	
Coon Rapids	51	−15	26.5	0.26	0.5
Corning	50	−10	28.0	0.25	
Council Bluffs	63	− 8	28.8	0.19	
Cresco	40	−18	19.0	0.80	7.0
Cumberland	.....	.....	.....	0.10	1.0
Danville	.....	.....	.....	1.20	1.0
Decorah	43	−17	20.2	1.07	7.0
Delaware	46	−13	24.1	0.74	1.0
Denison	54	−14	26.1	0.20	T.
Desoto	53	− 9	26.9	0.20	.....
Dows	51	−15	22.8	0.35	3.5
Eldon	58	− 8	30.0	0.57	0.3
Elkader	54*a*	−12	24.5	0.73	3.0
Emerson	.....	.....	.....	0.29	0.6
Emmetsburg	.....	.....	.....	0.36	
Fairfield	53	− 7	29.0	0.83	T.
Fayette	44	−14	22.2	0.88	4.9
Fonda	56	−14	22.4	0.85	8.2
Forest City	50	−17	21.4	0.65	4.0
Fort Dodge	.....	−14	.....	0.10	1.0
Fort Madison	.....	.....	.....	2.00	
Galva	57	−13	24.5	T.	T.
Gilman	.....	.....	.....	0.14	T.
Gladbrook	.....	.....	.....	1.35	2.0
Glenwood	56	− 8	30.0	0.27	T.
Grand Meadow*[1]	40	−14	21.8	0.64	6.0
Greene	47	−13	23.6	0.55	6.0
Greenfield	52	−12	26.8	0.33	0.3
Grinnell	48	−10	25.8	0.54	T.
Grinnell (near)	48	−11	26.2	0.70	0.7
Griswold	.....	.....	.....	0.34	T.
Grundy Center	50	−15	22.4	0.42	4.0
Guthrie Center	52	−11	28.5	T.	T.
Hamburg	.....	.....	.....	T.	T.
Hampton	53	−14	23.3	0.47	4.0
Harlan	52	−12	26.0	0.35	0.3
Hawkeye	.....	.....	.....	0.96	7.5
Hedrick	53	− 9	2[illegible].2	0.27	0.5
Hopeville	51	−10	27.8	0.17	T.
Hoprig	.....	.....	.....	0.25	2.5
Humboldt	52	−13	24.5	0.27	
Independence	46	−13	23.2	0.34	3.2
Indianola	52	−10	27.7	0.39	0.7
Iowa City	54	−10	27.1	0.73	1.0
Iowa Falls	48	−13	22.2	0.46	4.0
Keosauqua	56	− 6	30.0	0.75	T.
Knoxville	55	− 8	29.0	0.15	T.
Lacona	.....	.....	.....	0.25	T.
Lamoni	53	− 9	29.0	0.23	
Lansing	51	−13	24.7	1.05	9.4
Larchwood	59	−15	22.6	0.05	0.2
Larrabee	57	−16	23.2	0.35	0.8
Leclaire	.....	.....	.....	1.16	2.0
Lemars	58	−13	25.4	0.24	2.5
Lenox	51	−11	27.8	0.39	T.
Lockridge	.....	.....	.....	0.15	1.5
Logan	53	−10	27.1	0.20	T.
Maple Valley	.....	.....	.....	0.38	2.0
Maquoketa	54	−11	25.7	0.83	2.5
Marshalltown	51	−12	26.4	1.08	.....
Mason City	48	−18	20.8	0.70	3.0
Melrose	.....	.....	.....	0.20	2.0
Monticello	48	−12	25.9	0.73	4.0
Mooar	58	− 4	30.6	2.47	
Mountayr	52	−10	27.8	0.24	T.
Mount Pleasant	54	−12	26.0	1.23	T.
Mount Vernon *a**[1]	49	−14	24.8	.....	.....
Mount Vernon *b*	51	−12	26.2	0.91	2.4
New Hampton	42	−15	21.4	1.22	7.0
Newton	.....	−13	.....	0.37	T.
North McGregor	.....	.....	.....	1.07	5.6
Northwood	49	−16	21.2	0.65	5.0
Odebolt	57	−12	26.0	T.	T.
Ogden	54	−12	26.2	0.31	1.2
Olin	49	−11	29.7	0.81	2.0
Onawa	63	−10	27.9	0.26	
Osage	43	−17	20.4	0.93	7.0
Osceola	54	−10	27.9	0.19	1.0
Oskaloosa	55	−10	24.5	0.34	0.6
Ottumwa	66	− 6	29.8	0.50	1.0
Ovid	57	− 9	28.0	0.25	0.2
Pacific Junction	54	− 8	27.9	0.27	0.2
Pella	47	−10	23.8	0.10	
Plover	55	−14	25.1	0.35	2.5
Primghar	60	−16	27.0	0.10	1.0
Redoak	58	− 8	31.6	0.34	0.5
Ridgeway	45	−16	24.4	1.65	6.6
Rockwell City	53	−13	23.8	0.55	3.0
Ruthven	.....	.....	.....	0.47	4.0
Sac City	56	−13	25.8	0.38	1.3

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Temperature. Minimum.	Temperature. Mean.	Precipitation. Rain and melted snow.	Precipitation. Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Scranton	52	−11	26.7	T.	T.
Sheldon	55	−15	25.0	0.27	1.7
Sibley	55	−17	22.6	0.22	1.2
Sigourney	55	−10	23.8	0.32	0.4
Sioux Center	54	−15	23.4	0.15	1.5
Spirit Lake	51	−16	22.3	0.32	2.0
Storm Lake	54	−14	24.2	0.35	2.1
Stuart	48	−12	24.4	......	......
Thurman	57	−5	28.6	0.80	T.
Toledo	54	−12	24.6	0.33	......
Villisca	50	−9	26.8	0.32	
Vinton *[1]	50°	−11	25.4°	0.20	2.0
Wapello	58	−6	29.4	1.40	1.2
Washington	54	−11	26.4	0.74	......
Washta	......	......	......	0.34	T.
Waterloo	49	−12	24.1	0.70	3.5
Waverly	46	−12	23.3	0.64	......
Westbend *[1]	53	−15	21.9	0.70	6.5
West Union	......	......	......	0.45	4.5
Whitten	48	−15	22.4	0.10	1.0
Winterset	52	−11	27.0	0.23	T.
Woodburn	......	......	......	0.27	1.0
Kansas.					
Abilene	61	3	34.6	0.20	T.
Achilles	......	......	......	0.04	0.4
Altoona *[3]	59	7	33.2	0.34	T.
Anthony	......	......	......	0.46	T.
Atchison *a*	63	−2	34.0	0.32	0.2
Atchison *b*	......	......	......	0.45	
Augusta	64	5	37.2	0.12	
Beloit	60	−2	31.6	0.15	
Burlington	61	1	35.7	0.40	
Campbell	59	−5	32.2	0.32	
Centropolis *[1]	64	0	34.0	0.12	0.2
Chanute	68	5	40.2	0.40	
Colby	68	−8	33.7	T.	T.
Columbus	66	5	36.8	0.85	0.7
Coolidge	75	4	35.5	T.	T.
Cunningham	65	4	36.6	0.04	T.
Delphos	65	2	34.6	0.60	T.
Dresden	62	−6	34.5	T.	T.
Ellinwood	65	3	34.9	0.17	T.
Emporia	65	......	......	0.00	
Englewood	74	8	39.1	0.40	1.5
Eskridge	62	0	34.8	0.15	T.
Eureka	......	......	......	0.41	
Eureka Ranch	69	−1	33.8	T.	T.
Fallriver	64	2	38.4	0.40	T.
Fanning	63	−3	32.9	0.05	T.
Frankfort	64	−3	32.9	0.65	T.
Garden City	67	3	35.6	0.15	1.0
Garfield	......	......	......	0.02	T.
Grenola	65	3	37.5	0.39	T.
Hays	69	2	35.4	0.10	1.0
Horton	59	−2	32.8	0.20	T.
Hutchinson	67	9	39.2	0.28	T.
Independence	68	6	38.4	0.45	0.8
Lakin	70	3	36.0	0.00	
Lawrence	63	0	34.6	0.13	T
Lebo	61	0	35.0	0.18	T.
Little River	66	4	34.0	0.15	
Macksville	71	6	35.8	0.28	T.
McPherson	64	4	35.3	0.38	T.
Manhattan *b*	65	1	33.3	0.12	
Manhattan *c*	67	−2	34.4°	0.08	T.
Marion	59	5	36.1	0.10	
Meade	69	8	41.4	T.	
Medicine Lodge	66	6	37.0	0.04	T.
Minneapolis	62	3	33.7	0.06	T.
Morantown	60	2	36.4	0.36	T.
Ness City	67	4	36.0	0.25	
Newton *	65	4	37.2	0.18	
Norwich	64	7	38.4	0.06	T.
Oberlin	......	......	......	T.	T.
Olathe	62	−1	35.4	0.55	
Osage City	65	−1	35.5	0.05	T.
Oswego	70	6	38.7	0.30	T.
Ottawa	62	0	35.4	0.18	T.
Phillipsburg	64	−2	32.8	T.	T.
Pratt	65	7	36.2	0.36	
Rome *[1]	63	8	37.8	0.43	T.
Russell	66	2	33.7	0.47	T.
Salina	62	2	33.2	0.10	T.
Scott	69	0	33.3	0.00	
Sedan	65	5	36.8	0.18	
Seneca	64	−2	32.4	0.10	T.
Toronto	66	......	......	0.35	
Tribune	65	1	34.3	T.	T.
Ulysses	69	5	36.2	0.10	1.0
Valley Falls	61	−2	33.8	0.11	T.
Viroqua	67	6	37.2	0.30	2.0
Wakeeney (near)	......	......	......	T.	T.
Wallace	......	......	......	0.05	0.5
Wamego *[1]	63	0	32.7	0.17	T.
Winfield	64	6	38.4	0.57	0.2
Yates Center	62	−2	35.4	1.06	T.
Kentucky.					
Alpha *[3]	77	3	38.4	2.86	1.0
Bardstown	66	0	37.4	2.94	
Blandville	65	5	38.0	2.75	0.3
Bowling Green	67	4	38.2	3.15	0.2
Burnside	......	......	......	2.48	
Caddo	56	0	32.8	2.40	1.0
Canton *[1]	65	5	40.4	2.85	0.3
Carrollton	60	0	34.6	2.42	T.
Catlettsburg	64	......	......	2.92	1.2
Earlington	65	3	38.1	4.00	0.7
Edmonton	66	1	37.8	2.26	1.5
Eubank	64	−6	37.2	3.42	T.
Falmouth	......	......	......	2.85	1.2
Frankfort	64	3	37.6	2.38	1.0
Georgetown	62	−2	36.3	......	......
Greensburg	65	−8	35.4	2.16	0.8
Henderson	63	6	36.4	1.67	0.5
Hopkinsville	64	1	37.2	2.61	T.
Irvington	64	3	37.4	2.56	0.2
Jackstown	68	−2	38.3	2.28	T.
Leitchfield	65	1	36.8	3.06	0.2
Loretto	69	−8	36.0	2.80	0.5
Marrowbone	66	−3	37.2	2.34	1.0
Maysville	66	−4	34.2	2.48	1.2
Mount Hermon	63	−1	37.0	2.32	0.8
Mount Sterling	61	0	35.1	3.35	1.5
Owensboro	67	4	39.2	2.96	0.5
Owenton	63	−3	34.9	4.94	3.5
Paducah *a*	......	......	......	3.01	0.5
Paducah *b*	76	8	40.8	2.60	0.5
Pikeville	64	−5	37.0	2.60	3.2
Princeton	65	5	37.7	3.86	T.
Richmond	64	−1	35.0	2.19	2.0
St. John	64	−1	37.0	2.98	0.2
Scott	61	−2	34.0	2.65	1.3
Shelby City	65	−2	36.6	2.92	1.1
Shelbyville	63	2	36.5	4.10	2.5
Vanceburg	63	1	36.7	2.50	T.
Williamsburg	66	−1	39.0	1.65	T.
Louisiana.					
Abbeville	77	25	52.4	2.85	
Alexandria	74	18	49.9	3.98	
Amite	73	18	50.0	6.58	
Bastrop	72	16	48.4	2.66	T.
Baton Rouge	78	20	52.2	7.84	
Calhoun	69	17	45.6	3.74	
Clinton	73	20	49.7	4.77	
Como	73	16	46.5	2.65	T.
Donaldsonville	74	23	49.6	3.10	
Emilie	69	23	50.4	7.80	
Farmerville	71	14	45.9	2.72	0.4
Franklin	71	24	50.0	3.39	
Grand Coteau	73	22	51.2	5.56	
Hammond	76	19	52.0	10.68	
Jeanerette	71	20	49.6	3.35	
Jennings	76	20	51.4	8.54	
Lafayette	73	22	50.8	4.85	
Lake Charles	75	23	51.6	5.45	
Lake Providence	73	15	47.8	2.90	
Lawrence	76	27	50.7	1.60	
Libertyhill	76	15	49.1	3.88	T.
Mansfield	75	15	46.0	4.28	T
Melville	74	16	50.4	5.72	
Minden [d]	74	15	45.0	3.09	T.
Monroe	74	17	46.2	4.13	T.
New Iberia	69	22	50.6	4.45	
Oakridge [k]	71	17	48.0	6.53	
Opelousas	......	21	......	4.98	
Oxford	74	15	47.1	4.20	T.
Paincourtville	74	22	52.6	5.87	
Plain Dealing	74	12	46.4	2.69	0.2
Plaquemine	72	24	52.2	9.50	
Prevost	78	20	51.2	6.01	
Rayne	75	24	51.5	9.91	
Robeline	......	20	......	3.50	T.
Ruston	71	15	47.2	3.49	T.
Schriever	78	21	52.0	3.27	
Shellbeach	72	24	51.6	7.93	
Southern University	76	23	51.0	3.14	
Sugar Ex. Station	70	24	49.9	3.96	
Sugartown	69	22	51.0	6.84	
Wallace	74	24	51.6	9.16	
White Sulphur Springs	......	19	......	4.11	1.5
Maine.					
Bar Harbor	51	−5	23.9	11.15	19.3
Belfast *[4]	45	−2	22.8	5.68	16.0
Calais	45	−14	19.5	5.59	20.0
Carmel	42	−12	18.3	......	......
Cornish *[1]	49	0	21.5	5.81	28.0
Fairfield	47	−28	18.5	5.89	19.5
Farmington	54	−17	17.0	6.19	36.5
Flagstaff	46	−23	14.8	4.30	30.0
Gardiner	47	−11	19.8	7.19	15.5
Kineo	42	−10	15.4	5.17	31.7
Lewiston	56	−10	19.9	6.85	25.0
Mayfield	44	−11	15.4	6.27	38.0
Maine—Cont'd.	°	°	°	*Ins.*	*Ins.*
North Bridgton	45	−14	18.4	6.44	25.8
Orono	46	−19	17.8	8.14	26.3
Petit Menan *[1]	35	6	25.2	......	......
Rumford Falls	47	−14	16.2	5.80	37.8
Winslow	49	−24	24.6	6.35	21.0
Maryland.					
Annapolis	60	10	35.8	3.00	1.0
Bachmans Valley	55	5	30.9	2.21	0.5
Boettcherville	63	6	34.6	1.70	......
Boonsboro *a*	62	8	32.6	2.31	2.0
Cambridge *	62	16	38.0	3.25	T.
Chase	60	0	32.0	2.94	1.0
Chewsville	60	0	33.3	2.34	T.
Coleman	60	......	......	3.59	1.5
Collegepark	61	6	31.6	1.71	0.1
Cumberland	69	7	37.0	2.05	0.5
Darlington	59	7	32.8	2.64	2.5
Deerpark	55°	−8°	27.8°	1.97	......
Denton	59	9	35.8	2.72	......
Easton	60	12	36.2	2.71	......
Ellicott City	62	6	33.4	2.34	1.6
Fallston	57	8	33.4	2.30	2.0
Frederick	61	11	33.8	2.38	1.0
Frostburg	57	0[j]	32.2°	2.47	4.8
Grantsville	57	−5	28.0	1.86	4.5
Greatfalls	62	5	31.6	2.12	......
Greenspring Furnace	60	8	32.4	2.04	T.
Hagerstown	63	9	33.8	2.60	2.2
Hancock	62	6	33.0	1.70	......
Harney	......	......	......	2.32	......
Jewell	63	9	36.2	2.42	T.
Johns Hopkins Hospital	62	8	33.5	2.56	1.0
Laurel	65	3	33.4	1.67	1.0
McDonogh	5	7	34.1	......	......
Mount St. Marys Coll	60	4	32.8	1.97	1.0
Newmarket	59	9	32.3	2.38	0.8
Pocomoke	61	14	38.8	2.43	T.
Princess Anne	60	6	36.2	2.89	1.5
Queenstown	59	9	34.5	2.79	1.0
Rockhall *b*	57	10	35.1	2.63	2.7
Sandy Point	65	9	38.5	1.90	......
Sharpsburg	60	8	32.7	2.00	0.5
Smithsburg *a*	61	3	32.6	1.65	1.0
Smithsburg *b*	60	7	33.5	3.21	1.1
Solomons	63	15	38.0	3.15	1.0
Sudlersville	63	12	37.5	3.73	......
Sunnyside	55	−8	27.2	3.31	7.5
Takoma Park	66	4	34.4	1.98	1.0
Taneytown	60	10	31.6	1.50	0.8
Van Bibber	57	5	31.0	2.85	......
Westernport	55	3	29.6	1.34	1.5
Westminster	58	5	32.2	2.20	T.
Woodstock	59	5	32.1	1.66	0.4
Massachusetts.					
Adams	52	4	26.8	......	......
Amherst	52	−1	26.2	4.48	11.5
Attleboro	......	......	......	4.26	......
Bedford	51	−2	26.1	5.03	9.0
Bluehill (summit)	56	4	27.8	4.25	10.0
Cambridge	56	2	28.8	4.71	......
Chestnuthill	56	−6	28.4	4.38	7.5
Cohasset	......	......	......	4.43	6.0
Concord	55	−9	25.6	3.56	8.5
Dudley *[1]	53	4	27.6	3.53	T.
East Templeton *[1]	50	2	24.0	4.11	13.0
Fallriver	56	8	30.5	4.15	8.0
Fitchburg *a* *[1]	50	2	25.4	4.03	12.0
Fitchburg *b*	51	−2	25.6	4.49	13.0
Framingham	58	−2	28.4	4.64	......
Groton	53	−6	24.1	4.63	13.5
Hyannis *[1]	54	10	32.0	5.55	5.6
Jefferson	......	......	......	4.89	11.2
Lawrence	54	−13	25.6	5.10	16.0
Leeds	52	−6	24.9	3.65	12.5
Leominster	......	......	......	4.27	12.0
Longplain	......	......	......	3.24	5.0
Lowell *a*	52	−6	25.9	5.45	......
Lowell *b*	57	−5	25.5	......	......
Ludlow Center	50	−8	23.6	3.84	10.5
Lynn	58	6	29.0	3.18	......
Middleboro	60	−6	28.9	4.43	6.2
Monson	55	−2	26.4	4.51	11.0
New Bedford *a*	59	12	32.6	5.24	7.5
New Salem	52	1	24.0	4.20	18.3
Pittsfield	50	2	23.1	3.89	15.0
Plymouth *[1]	62	3	30.8	5.03	7.0
Princeton	......	......	......	4.64	11.0
Provincetown	56	4	32.4	3.74	......
Salem	......	......	......	4.91	16.0
Somerset *[1]	60	0	30.8	4.45	9.0
South Clinton	......	......	......	5.02	9.5
Springfield Armory	58	3	28.2	3.70	13.0
Sterling	......	......	......	4.19	10.5
Taunton *c*	59	−11	28.5	5.21	......
Webster	......	......	......	4.42	7.5
Westboro	54	0	28.3	4.86	8.0

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TABLE II.—*Climatological record of voluntary and other cooperating observers*.—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Massachusetts—Cont'd.	°	°	°	*Ins.*	*Ins.*
Weston	56	− 8	28.2	4.42	9.6
Williamstown *[1]	46	5	25.0	3.61	16.5
Winchendon	.....	.....	.....	4.27	22.0
Worcester *b*	56	2	26.8	3.13	9.0
Michigan.					
Adrian	53	− 4	26.7	0.72	1.0
Agricultural College	47	−10	25.6	1.17	3.6
Allegan	50[a]	− 8[a]	29.4[a]	1.33	12.5
Alma	47	− 7	26.0	1.59	8.0
Ann Arbor	50	− 7	26.6	1.06	4.0
Arbela	47	− 7[a]	26.7[c]	0.94	5.0
Baldwin	43	− 5	21.8	1.00	9.0
Ball Mountain	49	− 6	26.0	0.99	4.7
Battlecreek	53	− 4	27.0	1.10	3.1
Bay City	48	− 7	25.4	1.49	3.2
Berlin	48	− 9	25.0	1.61	11.8
Berrien Springs	59	− 1	29.8	3.99	30.0
Big Rapids	44	−11	24.0	2.98	10.5
Boon	41	−14	21.2	3.12	24.7
Calumet	48	− 7	19.7	1.84	22.0
Carsonville	48	−10	25.2	1.38	10.5
Charlevoix	43	0	25.0	2.95	24.0
Cheboygan	45	− 8	23.6	0.80	6.0
Clinton	51	− 6	28.0	1.07	2.3
Coldwater	54	− 5	26.7	1.14	5.5
Eagle Harbor	51	− 1	23.2	2.17	20.5
East Tawas	46	− 7	24.4	0.74	T.
Eloise	47[d]	− 4	27.1	1.14	3.3
Ewen	.....	.....	.....	0.75	7.5
Fairview	49	− 6	26.2	0.33	1.0
Fitchburg	48	− 8	26.4	1.53	6.5
Flint	.....	− 6	.....	1.12	6.5
Frankfort	47	0	26.7	1.78	16.5
Gladwin	45	−26	24.3	1.20	10.5
Grand Rapids	49	− 5	28.0	2.42	12.0
Grape	52	− 4	28.3	1.09	2.0
Grayling	42	−12	21.3	1.00	7.5
Hanover	50	− 8	26.4	0.97	5.8
Harbor Beach	50	− 5	25.6	0.60	4.7
Harrison	40	−11	21.1	0.91	9.1
Harrisville	48	−14	22.8	1.24	8.5
Hart	43	− 7	26.2	2.45	13.0
Hastings	49	−16	26.4	1.39	4.8
Hayes	48	− 8	24.3	0.68	6.8
Highland Station	.....	.....	.....	1.78	7.0
Hillsdale	52	− 6	27.0	0.79	3.0
Holland *[9]	42	7	34.2	.....	.....
Howell	49	− 2	26.2	.....	.....
Humboldt	48	−19	14.6	0.28	2.0
Ionia	47	−12	26.2	0.93	2.8
Iron Mountain	55	−13	20.4	0.40	2.1
Iron River	50	−15	18.4	0.60	6.0
Ishpeming	47	−10	17.0	0.80	8.0
Ivan	45	− 7	21.8	2.56	22.0
Jackson	50	− 6	27.8	1.03	2.3
Jeddo	47	− 7	24.4	1.90	17.0
Kalamazoo	55	− 4	27.6	1.77	6.0
Lake City	41	−11	22.2	0.90	9.0
Lansing	49	− 7	26.6	1.43	4.2
Lapeer	50	1	28.9	1.23	10.0
Lathrop	49	− 9	21.0	0.87	5.5
Lincoln	44	− 9	23.0	0.70	6.0
Ludington	42	− 3	26.4	0.97	9.0
Luzerne	43	−12	21.2	1.61	9.0
Mackinaw	46	− 7	23.6	0.88	7.0
Madison	50	− 5	27.1	1.06	2.1
Mancelona	43	−10	20.9	2.39	18.0
Manistee [j]	44	− 2	25.4	1.22	12.0
Manistique	40	− 5	23.2	0.82	4.0
Menominee	40	− 9	19.8	0.40	4.0
Middle Island *[10]	42	0	24.6	.....	.....
Mottville	58	− 9	27.4	1.27	3.9
Mount Clemens	48	− 4	26.4	0.20	T.
Mount Pleasant	45	− 8	25.7	1.63	5.3
Muskegon	48	− 1	26.7	1.85	8.0
Newberry	42	− 6	20.0	0.55	4.5
Northport	45	2	25.3	2.50	25.0
Old Mission	45[c]	− 1[c]	25.4[c]	1.00	10.0
Olivet	51	− 5	27.0	1.25	3.5
Omer	45	−12	21.8	0.55	5.5
Ovid	48	− 7	26.0	0.99	5.0
Owosso	50	− 7	26.1	1.28	6.0
Petoskey	43	− 3	24.5	2.44	22.0
Plymouth	49	−15[a]	22.2[c]	.....	.....
Port Austin	48	− 6	24.0	T.	T.
Reed City	42	−15	22.3	1.95	19.0
Rogers	47	− 5	22.1	0.60	6.0
Romeo	48	− 5	26.1	1.13	T.
Saginaw	50	− 7	26.7	1.39	6.2
St. Ignace	46	−11	21.0	0.64	7.0
St. Johns	50	− 6	27.4	0.71	5.3
St. Joseph	58	− 1	30.3	1.47	5.0
Sidnaw	47	−15	19.0	0.85	8.5
Somerset	50	− 7	26.4	0.55	1.0
South Haven	55	8	29.7	1.38	9.8
Stanton	45	−10	22.8	.....	.....

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Thomaston [f]	50	−14	20.2	1.20	12.0
Thornville	47	− 6	27.2	1.04	11.0
Traverse City	42	0	26.4	2.45	20.5
Vandalia	56	− 5	28.0	2.24	10.0
Vassar	49[a]	− 5	27.8[a]	1.34	10.5
Wasepi	50	− 6	27.6	0.99	3.0
Waverly	52	− 2	26.0	3.60	11.1
Wetmore	44	− 7	19.3	1.58	14.0
Whitecloud	46	−15	25.8	1.35	11.0
Ypsilanti	49	− 5	27.3	1.56	5.2
Minnesota.					
Ada	50	−25	13.7	0.08	1.0
Albert Lea	50	−17	22.6	0.03	0.3
Alexandria	46	−26	16.7	0.29	2.9
Ashby	45	−22	16.0	0.38	4.5
Bemidji	.....	−26	.....	0.33	4.0
Bird Island	53	−19	19.6	0.36	3.6
Blooming Prairie	45	−18	19.7	0.50	5.0
Brainerd	46	−25	16.5	0.32	3.5
Caledonia	41	−19	20.4	0.81	6.2
Camden	59	−17	20.9	0.13	1.8
Collegeville	49[j]	−19	20.0[a]	0.90	3.5
Crookston	47	−23	13.8	0.32	3.2
Currie	53	−18	20.4	0.23	2.3
Deephaven	.....	.....	.....	0.64	5.0
Detroit City	48	−27	12.0	0.50	3.5
Faribault	48	−19	20.6	0.25	3.8
Farmington	50	−23	19.4	0.55	5.0
Fergus Falls	47	−24	15.9	0.41	4.1
Glencoe	55	−18	21.0	.....	.....
Grand Meadow	40	−18	19.2	0.55	6.5
Hallock	42	−32	8.8	0.48	4.8
Lake City	47	−18	22.0	0.57	2.7
Lake Jennie	57	−19	24.2	T.	T.
Lakeside	55	−19	21.0	0.13	2.0
Lake Winnibigoshish	52	−29	14.2	0.81	8.3
Leech	53	−33	11.4	0.61	6.3
Leroy	47	−17	22.2	0.95	9.5
Long Prairie	46	−24	16.8	0.31	3.5
Luverne	55	−16	22.0	.....	.....
Lynd	59	−23	21.3	0.25	3.5
Mapleplain *[1]	51	−20	20.0	0.63	5.5
Milan	61	−21	18.8	0.51	5.1
Minneapolis *a*	47	−20	18.9	0.55	5.1
Minneapolis *b*[1]	48[a]	−20	20.3	0.61	4.4
Minnesota City *[1]	44	−20	24.3	0.58	5.0
Montevideo	57	−21	19.0	0.51	5.6
Morris	50	−20	18.7	0.52	5.2
Mount Iron	49	−30	13.2	0.62	8.0
Newfolden	43	−32	9.0	0.27	3.2
New London	50	−21	15.7	0.30	3.1
New Richland *[1]	46	−20	19.2	.....	.....
New Ulm	54	−17	20.4	0.23	2.0
Park Rapids	45	−28	13.8	0.32	3.2
Pine River	46	−26	14.8	0.36	4.7
Pipestone	55	−19	19.6	0.12	1.2
Pleasant Mounds	52	−17	22.0	0.31	3.2
Pokegama Falls	50	−38	10.9	0.55	6.8
Redwing	.....	.....	.....	0.79	6.0
Reeds	.....	.....	.....	1.05	2.8
Rolling Green	49	−16	21.4	0.50	5.0
St. Charles	45	−17	20.3	1.27	6.5
St. Cloud	50	−21	19.6	0.27	3.0
St. Peter	51	−14	22.4	0.35	2.5
Sandy Lake Dam	48	−27	14.4	0.66	9.1
Shakopee	50	−19	21.4	0.44	3.2
Tower	50	−29	13.5	1.00	10.0
Two Harbors	57	−25	18.3	0.59	5.0
Wabasha *[1]	47	−17	22.0	0.63	6.5
Willmar	54	−20	18.3	0.29	3.2
Willow River	47	−26	16.5	0.67	8.8
Winnebago City	51	−19	22.5	0.45	3.5
Worthington	51	−17	21.7	1.19	3.5
Zumbrota *[1]	48	−21	21.8	.....	.....
Mississippi.					
Aberdeen	66	12	41.0	1.20	T.
Americus	73	19	50.0	5.39	T.
Austin	75	14	44.5	2.89	T.
Batesville	68	12	41.2	1.67	
Bay St. Louis	70	22	48.5	8.16	
Biloxi	71	23	49.8	6.32	T.
Booneville	64	11	40.6	2.09	
Brookhaven	74	12	45.6	3.88	T.
Canton	71	18	46.9	2.29	
Columbus *a*	.....	.....	.....	3.53	
Columbus *b*	69	17	43.6	2.85	
Crystalsprings	72	18	47.6	3.07	
Edwards	70	17	47.0	2.71	
Fayette	70	18	47.5	3.00	T.
Greenville *a*	67	15	44.8	1.93	T.
Greenville *b*	72	16	46.1	1.94	T.
Greenwood	73	17	47.1	1.81	
Hattiesburg	68	19	47.0	4.88	T.
Hernando	68	13	42.6		
Holly Springs	66	12	41.2	2.23	0.2
Jackson	72	20	44.6	2.43	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Mississippi—Cont'd.	°	°	°	*Ins.*	*Ins.*
Kosciusko	71	15	45.9	2.50	T.
Lake	68	10	44.4	2.86	
Leakesville	73	13	48.0	5.31	
Logtown	70	21	50.4	5.77	
Louisville	70	13	43.5	3.48	T.
Macon	69	14	43.8	2.79	
Magnolia	71	17	48.0	4.01	
Natchez	72	22	50.6	2.80	T.
Palo Alto	69	15	44.8	2.53	T.
Pontotoc	69	11	43.4	1.75	T.
Port Gibson	72	20	48.2	2.82	T.
Ripley	65[i]	9[i]	38.4[i]	2.46	
Stonington *[1]	70	22	47.6	.....	
Thornton	73	19	48.6	3.30	
Tupelo	.....	.....	.....	2.23	
University	68[b]	13[d]	44.1[e]	2.10	0.5
Watervalley	70	21	48.4	1.96	T.
Waynesboro	78	15	47.0	2.25	
Windham	71	15	46.6	4.17	T.
Woodville	69	19	48.6	4.03	
Yazoo City	74	17	45.4	2.40	T.
Missouri.					
Appleton City	63	2	36.8	1.23	0.5
Arlington	.....	.....	.....	1.81	
Arthur *[3]	.....	3	33.2	0.25	
Avalon	59	− 5	32.4	0.67	T.
Bethany	57	− 5	29.4	0.47	
Birchtree	69	3	37.9	1.56	0.5
Boonville	.....	.....	.....	1.07	
Brunswick	58	− 2	31.0	1.15	
Carrollton	58	0	34.2	0.75	
Conception	67	− 8	32.3	T.	
Cook Station	70	0	37.6	0.75	
Cowgill *[5]	60	− 4	31.9	0.36	
Darksville	55	− 3	30.8	0.75	
Downing	.....	.....	.....	1.46	
East Lynne *[3]	.....	1	33.2	0.93	T
Edgehill *[5]	58	2	33.5	1.10	T.
Edwards	69	3	37.2	0.99	T.
Eightmile *[1]	60	0	35.6	0.96	T.
Eldon	65	1	35.8	1.68	
Elmira	62	− 3	32.5	0.30	
Fairport	.....	.....	.....	0.66	
Fayette	62	− 3	32.6	1.15	0.2
Fulton	.....	.....	.....	1.35	T.
Galena	.....	.....	.....	2.50	1.5
Gallatin *[1]	57	− 3	31.2	0.50	T.
Gayoso	66	6	40.0	2.96	0.5
Glasgow	62	− 2	32.8	1.53	.....
Gorin	.....	.....	.....	1.02	
Halfway	67	3	38.0	1.31	T.
Harrisonville	61	0	33.4	0.43	0.5
Hazlehurst	.....	.....	.....	0.36	
Hermann	.....	.....	.....	1.02	
Houston	68	2	36.8	1.31	T.
Houstonia (near)	.....	.....	.....	0.87	0.2
Irena	.....	.....	.....	0.23	T.
Ironton	68	0	35.6	1.20	T.
Jackson *[3]	64	5	34.2	1.64	1.5
Jefferson City	70	2	39.1	2.17	
Kidder	59	− 4	31.2	0.28	T.
Lamar	69	5	39.1	0.37	T.
Lamonte	.....	.....	.....	0.68	T.
Lebanon	67	2	36.0	1.74	
Lexington	63	0	35.4	0.63	
Liberty	62	− 2	32.6	0.15	
Louisiana	64	− 1	34.5	1.83	1.1
McCune *[1]	66	− 2	32.2	1.27	0.5
Macon	62	− 4	32.8	1.22	
Marblehill	67	2	36.9	1.63	0.5
Marshall	60	− 2	31.8	0.77	T.
Maryville	56	− 9	27.4	0.26	T.
Mexico	65	− 1	33.2	1.56	0.5
Miami *[5]	55	− 1	31.8	1.22	
Mineralspring	66	0	37.3	1.27	0.5
Montreal	65	0	36.6	1.58	0.2
Mount Vernon	77	4	38.0	0.89	0.8
Neosho	70	0	38.8	1.18	1.0
Nevada	.....	.....	.....	0.34	T.
New Haven	65	3	34.6	1.27	T.
New Madrid	.....	9	.....	5.21	1.0
New Palestine	63	0	33.1	1.60	T.
Oakfield	66	1	37.0	0.77	T.
Olden	68	1	37.4	1.61	T.
Oregon *a*	65	− 5	31.9	0.13	0.1
Oregon *b*	63	− 4	34.0	0.11	T.
Palmyra *[5]	58	− 4	30.6	2.40	
Phillipsburg *[1]	65	2	35.7	1.85	0.1
Pickering *[3]	64	− 6	29.0	0.42	T.
Poplarbluff	65	7	39.8	2.72	1.0
Potosi	66	− 5	34.3	1.05	T.
Princeton	55	− 7	29.2	0.73	
Richmond	60	0	33.3	0.53	T.
Rockport	.....	.....	.....	0.18	T.
Rolla	.....	.....	.....	1.38	T.
St. Charles	63	2	35.0	0.75	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Joseph				0.28	
Sarcoxie *[2]		3	34.8	1.00	2.0
Sedalia	62	− 2	34.3	0.46	T.
Seymour	65	− 2	34.8	2.78	T.
Shelbina				1.80	T.
Sikeston	68	8	39.6	2.38	0.8
Steffenville	59	− 4	32.2	3.25	T.
Sublett	58	− 6	29.7	1.75	T.
Trenton	52	− 4	31.1	0.50	
Unionville	60	− 8	28.6	0.67	
Vichy	64	1	37.0	1.75	T.
Warrensburg	61	0	35.6	1.28	T.
Warrenton	64	0	32.4	0.96	
Wheatland				0.23	T.
Willowsprings	68	− 1	37.2	0.42	0.8
Windsor	63	0	35.6	1.07	
Wylie	70	2	40.2	1.22	0.3
Zeitonia	69	2	37.5	1.85	0.5
Montana.					
Adel	58	−17	30.8	0.20	2.0
Billings	55	−11	30.2		
Boulder	47	− 7	27.4	0.53	2.0
Bozeman	49	3	30.8	0.11	1.1
Butte	47	0	30.2	0.30	3.0
Canyon Ferry	48	− 7	28.0	T.	T.
Chinook	62	−17	27.0	0.10	1.0
Corvallis	55	5	33.2	0.00	
Crow Agency	54	−18	26.7	0.04	0.5
Dearborn Canyon	60	− 9	34.0	0.20	2.0
Deerlodge	60	− 2	29.2	0.04	0.4
Dell	47	−13	19.6	0.20	2.0
Dillon	58	− 8	31.2	0.01	0.1
Ekalaka	55	−18	27.6	0.25	2.5
Fort Benton	68	− 9	33.0	T.	T.
Fort Logan	52	−12	24.8	T.	T.
Glasgow	49	−20	19.7	0.11	
Glendive	61	−13	25.9	0.01	T.
Glenwood	52	− 4	29.6	0.13	
Greatfalls	60	−10	32.8	0.02	0.2
Harlem	60	−25	26.4	0.20	2.0
Kipp	56	−20	26.8	0.17	1.0
Livingston	60			T.	T.
Manhattan	51	− 9	26.6	0.05	0.5
Martinsdale	54	0	31.7	0.20	2.0
Marysville	47	− 2	27.4	0.06	0.1
Missoula	46	6	29.8	0.15	2.5
Ovando	42	−17	19.8	2.51	11.2
Parrot	51	1	31.6	T.	T.
Plains	48	6	32.2	0.40	1.0
Poplar	50	−17	21.2	0.00	
Redlodge	50	−15	27.7	1.90	19.0
Troy	50	7	32.2	2.23	3.0
Twin Bridges	52	− 6	28.8	0.00	
Utica	62	−12	30.6	0.45	1.7
Wibaux	55	−18	24.6	T.	T.
Yale	58	−11	26.8	0.60	6.0
Nebraska.					
Agee				0.04	T.
Albion	63	−11	28.4	0.15	
Alliance				T.	T.
Alma	67	− 2	32.2	0.01	0.1
Ansley	64	− 7	29.6	T.	T.
Arapaho *[1]	66	− 2	35.3	T.	T.
Arborville *[1]	62	− 7	27.4	0.05	
Ashland *a*	58	− 6	30.0	0.10	1.0
Ashland *b* *[1]	54	− 6	29.9	0.17	T.
Ashton				0.02	T.
Auburn	58	− 4	31.6	0.25	
Aurora *[1]	60	− 5	31.1	0.03	T.
Bartley				0.05	0.5
Beatrice	58	− 3	31.0	0.50	
Beaver	68	− 5	33.0	T.	T.
Bellevue				0.29	0.2
Benedict				0.35	
Benkleman				T.	
Blair	58	−10	28.2	0.31	T.
Bluehill				T.	T.
Bradshaw				0.25	T.
Brokenbow *[1]	60	− 6	30.0	0.05	0.5
Burchard				0.00	
Burwell				T.	T.
Callaway	63	− 8	27.1	T.	T.
Camp Clarke	64	−10	27.8	T.	T.
Central City				T.	T.
Chester				T.	
Clatonia	59	− 5	29.8	0.00	
Cody				0.00	
Columbus	56	− 8	29.8	0.01	
Creighton *[1]	64	− 9	25.5		
Crete	59	− 6	24.8	0.20	T.
Culbertson				0.02	0.2
David City	59	− 8	29.0	0.15	
Dawson	65	− 3	32.6	0.10	
Eden				0.25	
Edgar *a*				0.10	T.
Elba				0.02	0.2
Nebraska—Cont'd.					
Ericson				T.	T.
Ewing				0.00	
Fairbury	65	− 3	31.0	T.	
Fairfield *b*	70	− 4	32.6	T.	T.
Fairmont	66	− 5	31.4	0.15	
Fort Robinson	68	− 6	33.3	0.17	0.7
Franklin	61	− 2	32.6	0.00	
Fremont	60	−10	28.3	0.24	T.
Geneva	60	− 4	29.4	0.17	
Genoa	64	− 8	29.4	0.04	
Gering	64	− 8	31.0	T.	T.
Gordon				0.05	
Gothenburg	60	− 6	30.2	T.	T.
Grand Island *a*				0.05	0.5
Grand Island *b*	65	− 5	31.6	0.00	
Grand Island *c*	65	− 6	30.3	0.08	T.
Greeley				0.02	0.2
Haigler				T.	T.
Hartington	60	−13	25.9	0.40	1.5
Harvard	62	− 4	30.5	0.16	T.
Hastings *[1]	59	− 7	29.4	T.	T.
Hayes Center				0.02	0.2
Hay Springs	67	−13	30.2	0.29	2.5
Hebron	64	− 2	31.4	0.05	T.
Holdrege *[1]	58	− 4	30.8	T.	T.
Hooper *[1]	58	− 8	27.4	0.10	
Imperial	66	− 5	32.4	0.07	0.5
Johnstown				0.00	
Kearney				T.	T.
Kennedy	67	−10	30.4	0.15	1.5
Kimball	65	− 7	33.1	T.	T.
Kirkwood *[1]	63	− 8	25.7	T.	
Lexington	65	− 8	31.0	T.	T.
Lincoln *d*	60	− 7	30.6	0.15	T.
Lodgepole	67	−10	30.9	T.	
Loup				T.	T.
Lynch	68	−17	28.6	T.	T.
Lyons				0.14	T.
McCook				0.20	2.0
McCool				0.05	
Madison	62	−10	29.8	0.14	T.
Madrid *[5]	65	−10	30.6	0.02	0.2
Marquette				T.	T.
Merriman				T.	T.
Minden *a*	62	− 5	31.2	0.05	0.2
Minden *b*				0.05	
Monroe				0.03	T.
Nebraska City *b*				0.15	
Nemaha *[1]	58	− 6	29.4	0.26	
Nesbit	60	− 9	27.5	T.	T.
Norfolk	64	−13	27.2	0.14	T.
North Loup	60	− 6	29.5	0.02	0.2
Oakdale	64	−12	27.7	0.13	0.3
Odell				0.47	T.
O'Neill	60	−15	27.0	T.	
Ord				0.03	
Osceola				0.10	
Ough				0.00	
Palmer *[2]	60	− 8	32.4	T.	
Palmyra				0.10	T.
Plattsmouth *b*				0.82	0.2
Pleasanthill				T.	T.
Ravenna *a*	66	− 4	30.2	0.01	0.1
Redcloud *b* *[1]	50	0	31.3	T.	T.
Republican *[1]	62	− 4	31.4	0.00	
Rulo				0.15	T.
St. Libory				0.04	T.
St. Paul	64	− 5	30.6	0.04	
Salem *[1]	58	− 4	33.4	0.20	
Santee	63	−13	28.0	T.	T.
Sargent				0.02	
Schuyler				T.	
Seneca *[1]	56	−10	30.3	T.	T.
Seward				0.40	
Smithfield				0.00	
Spragg				0.00	
Stanton *[1]	52	−13	25.4	0.24	
State Farm	60	− 5	31.6	0.12	
Strang				0.00	
Stratton				0.00	
Superior *[5]	58	− 4	30.8	T.	
Syracuse				0.35	
Tablerock				0.23	
Tecumseh *b*	58	− 5	30.4	0.25	
Tecumseh *c*				0.23	
Tekamah	62	−10	28.6	0.22	
Thedford				T.	
Turlington	57	− 5	30.4	0.28	T.
Valentine	65	−12	30.8	0.04	
Wakefield	60	−11	26.2	0.30	T.
Wallace				0.00	
Wauneta				0.00	
Weeping Water *[1]	53	− 7	25.5	0.26	T.
Westpoint	59	−10	27.7	T.	T.
Whitman				0.06	0.6
Wilber *[1]	56	− 4	30.1	0.12	
Nebraska—Cont'd.					
Willard				T.	T.
Wilsonville *[1]	62	− 4	29.9	T.	T.
Wisner				0.21	T.
Wymore *[1]	49	− 8	25.6	T.	T.
York *[1]	58	− 9	29.5	0.20	
Nevada.					
Battle Mountain *[1]	43	23	33.2	T.	
Belmont				0.37	T.
Beowawe *[1]	55	15	34.9	0.00	
Candelaria	71	12	42.4	T.	
Carlin *[1]	53	6	31.9	0.25	
Carson City	61	16	39.3	0.28	
Clover Valley				0.51	1.5
Cranes Ranch				0.35	
Duck Valley	53	10	35.5	1.36	T.
Elko (near)	56	5	35.8	1.55	0.5
Ely	49	10	31.6	0.20	0.5
Empire Ranch	62	7	34.8	0.20	1.5
Fenelon				0.25	2.5
Golconda *[1]	60	17	37.6	0.05	
Halleck *[1]	54	− 7	28.6	0.45	
Hawthorne	61	20	39.6	0.10	
Hot Springs *[1]	70	20	42.0	0.00	
Humboldt *[1]	58	15	36.5	0.75	
Lee				1.12	5.0
Lewers Ranch	60	18	39.5	0.96	
Los Vegas	62	25	45.4	0.00	
Lovelocks *[1]	56	20	39.3	0.20	
McGill [e]	52	9	31.5	T.	T.
Martins [d]	68	15	39.5	0.15	
Mill City *[1]	58	18	35.5	0.00	
Monitor Mill	49	12	31.8	0.17	
Palisade *[1]	56	4	32.3	1.72	4.0
Palmetto	65	11	36.8	0.45	
Reno State University	60	20	39.8	0.50	
Silverpeak	66	13	41.6	0.00	
Sodaville	65	10	40.0	T.	
Tecoma				T.	
Toano *[1]	52	17	33.6	0.40	4.0
Tuscarora	47	10	32.2	0.84	1.2
Tybo	48	18	34.9	0.70	
Verdi *[1]	68	20	40.2	0.74	T.
Wadsworth *[1]	68	8	38.0	0.35	
Wells *[1]	53	0	32.0	0.57	1.0
New Hampshire.					
Alstead				5.02	34.8
Berlin Mills	52	−20	15.8	4.91	39.5
Bethlehem	51	− 7	17.6	4.98	40.0
Brookline *[1]	55	−18	21.0	4.19	21.0
Claremont	50	−15	21.3	4.03	38.0
Concord	52	−16	20.9	4.88	27.6
Durham	55	− 4	23.4	5.62	23.5
Grafton	51	−25	17.1	4.62	38.0
Hanover	49	−16	17.4	3.35	30.5
Keene	49	−17	21.8	4.35	28.2
Littleton	60	− 7	18.5	4.63	38.5
Nashua	53	−16	23.4	4.46	20.3
Newton	53	−11	24.2	5.70	14.0
North Conway	54	− 9	18.8	5.75	35.0
Peterboro	46	−20	21.0	4.68	25.8
Plymouth	45	−15	17.0	4.86	39.8
Sanbornton	46	−12	19.6	5.25	40.0
Stratford	46	−10	17.0	3.03	24.5
Warner				5.79	33.5
New Jersey.					
Asbury Park	61	10	35.0	4.68	0.8
Bayonne	55	12	32.8	4.45	0.5
Belvidere	51	0	28.2	3.32	6.0
Bergen Point	55	14	33.0	5.33	0.5
Beverly	61	9	33.0	3.97	1.7
Billingsport *[1]	57	11	32.4	4.02	2.5
Boonton	53	0	29.4	3.32	4.7
Bridgeton	64	8	35.6	3.45	0.5
Camden	56	11	32.6	4.00	2.3
Cape May C. H.	61	9	35.8	3.38	T.
Charlotteburg	59	− 5	29.4	4.29	5.5
Chester	54	− 2	28.6	2.48	6.0
Clayton	61	7	33.8	3.59	0.1
College Farm	56	7	32.2	4.35	1.0
Deckertown	54	0	28.8	2.97	8.0
Dover	55	0	28.9	4.23	6.7
Egg Harbor City	60	5	33.2	3.12	2.0
Elizabeth	58	10	32.2	4.86	2.0
Englewood	52	6	30.1	4.60	1.5
Flemington	55	2	30.2	4.13	5.0
Freehold	58	9	32.4	4.33	
Friesburg	61	10	35.4	3.81	0.8
Hammonton				2.82	0.5
Hanover	52	5	30.6	4.54	8.0
Hightstown	57	9	31.8	3.51	0.1
Imlaystown	61	8	34.2	3.30	1.9
Lambertville	56	6	31.0	3.88	1.3
Lebanon				3.71	3.5
Moorestown	58	10	32.8	4.08	2.1
Mount Pleasant				2.48	1.4
Newark	54	8	30.3	4.28	2.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
New Jersey—Cont'd.					
New Brunswick	57	8	32.4	4.63	1.0
Newton				3.50	8.5
Ocean City	66	9	33.6	2.62	T.
Oceanic	61	9	32.9	5.50	0.6
Paterson	57	10	33.0	4.85	5.5
Perth Amboy	62	9	32.6	4.23	
Plainfield	54	7	30.8	4.25	1.0
Rancocas				3.75	2.3
Rivervale	56	2	30.6	5.32	8.0
Roseland	55	3	29.4	4.72	6.0
Salem	61	12	34.8	3.39	
Somerville	56	4	31.6	4.23	0.8
South Orange	54	8	30.4	4.26	2.0
Staffordville				3.95	0.3
Toms River	62	0	32.8	4.44	1.0
Trenton	57	12	34.6	4.90	0.2
Tuckerton	63	5	34.4	2.57	3.0
Vineland	61	8	35.2	2.58	1.5
Woodbine	60	8	35.7	2.80	1.5
New Mexico.					
Albert	61	14	40.6	0.84	2.0
Albuquerque	59	18	39.0	0.70	
Alma	65	15	40.6	0.29	
Aztec	55	10	34.7	0.12	
Bellranch				0.65	0.5
Bernalillo	64	14	39.9	0.55	
Bluewater	56	5	32.2	0.15	1.5
Cambray				0.00	
Deming				0.56	
East Lasvegas	60	5	35.2	0.19	1.6
Engle	65	15	42.0	0.23	
Espanola	58	5	34.4	0.10	
Folsom	58	7	32.8	0.07	1.0
Fort Bayard	68	19	43.3	0.15	
Fort Union	68	8	37.1	0.60	4.0
Gage				0.16	
Gallinas Spring	62	10	38.4	0.52	3.0
Hillsboro	69	18	42.4	0.34	1.0
Las Vegas Hotsprings	64	10	36.4		
Lordsburg				0.24	
Los Lunas	64	11	41.2	1.25	
Lower Penasco	70	20	44.0	0.90	0.5
Lyons Ranch	67	22	44.2	0.41	
Messilla Park	71	17	44.6	0.38	
Raton	63	8	31.2	0.15	
Roswell	70	20	42.9	0.96	T.
San Marcial	67	16	43.2	0.24	
Socorro	61	18	39.8	1.35	
Strauss				0.30	
Whiteoaks	58	16	37.2	1.05	9.0
New York.					
Adams				3.13	
Addison	51	5	28.8	1.92	4.0
Akron				1.98	
Alfred	48	−5	24.8	2.49	5.7
Angelica	50	−8	26.6	2.61	8.0
Appleton	46	2	27.2	2.58	13.4
Arcade	48	−4	24.1	4.00	11.4
Atlanta	48	−4	26.0	2.64	6.7
Auburn	50	1	26.2	2.98	12.0
Avon	51	−6	26.9	2.74	6.5
Axton	48	−15	16.6	2.93	
Baldwinsville	48	4	25.2	3.63	23.5
Bedford *a*	62	5	30.6	3.30	4.9
Bedford *b*				2.64	
Big Sandy*[10]	40	2	27.4		
Bolivar	48	−15	24.6	3.42	18.0
Bouckville	47	−1	21.2	3.82	12.0
Boyds Corners				4.18	8.5
Brentwood	58	0	32.0	5.15	2.5
Brockport	48	−2	27.2	4.00	11.5
Caldwell	45	−6	21.2	3.90	29.0
Canajoharie	45	4	23.6	2.47	6.0
Canton	42	−9	18.6	3.49	12.0
Carmel	56	5	29.0	4.06	7.5
Carvers Falls	43	−9	20.4	4.36	22.0
Catskill	50	1	27.2	2.74	9.0
Cedarhill	52	3	29.4	2.01	6.8
Charlotte*[10]	50	4	30.8		
Chenango Forks				3.70	
Cooperstown	45	1	23.5	3.08	9.5
Cortland	49	0	25.8	3.28	7.6
Cutchogue	56	11	31.4	4.98	6.2
Dekalb Junction				3.29	
Easton				4.72	
Elba	47	−5	26.9	3.85	9.0
Fayetteville				2.86	
Fleming	52	3	26.2	1.23	4.0
Franklinville	45	−14	24.6	3.37	9.9
Fulton				2.31	
Garrettsville	52	−2	22.5		
Glens Falls	44	0	22.0	4.25	29.2
Gloversville	45	0	19.9	4.87	19.8
Greenwich	43[f]	−2	23.8[e]	3.99	19.0
Haskinville				1.48	
Hemlock [h]	50	−1	24.0		
New York—Cont'd.					
Honeymead Brook	55	1	25.1	2.89	12.1
Humphrey	53	−4	26.0	3.70	21.7
Indian Lake	49	−11	19.4	3.22	20.6
Ithaca	53	2	27.2	2.39	11.8
Jamestown	47	−2	28.8	6.56	39.0
Jay	49	−7	19.4	2.39	13.0
Keene Valley	52	−7	20.1	2.62	15.5
King Station				5.15	
Liberty	54	2	23.8	3.51	10.5
Littlefalls	44	0	21.7	2.82	12.5
Lockport	46	3	27.8	1.80	15.0
Lowville	47	−11	20.6	3.88	29.0
Lyndonville				1.27	
Lyons	50[c]	5[c]	29.1[c]	3.48	15.0
Mayle				2.82	
Middletown	53	8	27.8	2.51	13.5
Mohonk Lake[1]	60*	5	26.4	2.61	12.8
Mount Morris	50	−8	27.6	1.68	0.6
Newark Valley				2.23	
New Lisbon	44	−3	22.5	2.04	6.8
North Germantown	50	4	27.2		
North Hammond	50	0	21.0	2.18	14.7
North Lake	51	−17	15.8	4.76	33.0
Number Four	50	−8	18.0	5.10	40.8
Nunda	51	−6	27.0	3.17	10.5
Ogdensburg	42	−6	20.0	2.93	9.0
Oneonta				2.63	
Oxford	45	0	24.4	3.19	11.3
Palermo	44	0	22.6	2.92	15.2
Penn Yan	52	5	28.0	1.99	4.3
Perry City	50	0	25.4	2.52	6.4
Phœnix				4.67	
Pine City				2.40	
Plattsburg Barracks	48	−7	19.2	3.46	14.0
Port Byron	47	5	26.2	4.50	26.0
Port Jervis	54	−1	27.8	2.32	9.5
Poughkeepsie	54	−1	27.2	1.88	11.0
Primrose	55	7	30.3	3.96	6.5
Richmondville	48	1	23.6	3.21	9.5
Ridgeway	46	−2	26.0	3.30	11.9
Rome	42	3	20.4	3.29	
Romulus	53	3	27.3	2.83	4.2
Rose				3.25	
St. Johnsville	42	2	23.6	3.66	13.8
Salisbury Mills				2.84	
Saranac Lake	49	−6	14.9	2.89	25.2
Saratoga Springs	43	0	22.2	3.82	24.5
Schenectady	48	3	24.6	5.79	9.6
Schenevus				2.61	
Setauket	58	13	32.3	4.92	2.7
Sherwood				2.83	
Shortsville	51	1	26.8	2.75	
Skaneateles				3.56	
South Canisteo	51	0	26.2	2.40	7.1
Southeast Reservoir				3.73	6.0
South Kortright	58	0	24.9	1.91	
Straits Corners	49	−6	24.9	2.54	8.2
Ticonderoga	48	−5	22.1	4.70	40.0
Volusia	47	−5	26.8		
Wappingers Falls	53	2	28.1	2.80	17.0
Warwick				2.99	
Watertown	44	−8	21.8	4.59	37.8
Waverly	55	0	27.9	2.00	6.8
Wedgwood	51	−1	25.6	2.56	6.5
West Berne	52	−4	26.6	2.61	14.5
West Chazy	45	−13	16.7		
Westfield *a*	48	−2	29.8	3.60	14.5
Westfield *b*	47	−3	27.6	3.73	
Westfield *c*	49	2	30.2		
Williamson				3.38	
Windham	56	−10	24.6	1.74	6.8
North Carolina.					
Abshers	69	4	37.4	3.35	
Asheville				2.26	T.
Biltmore	65	3	36.1	2.41	T.
Bryson City				2.85	
Chapelhill	69	9	40.6	3.23	1.8
Cherryville	75	6	43.0	3.31	
Currituck				3.62	3.1
Edenton	66	15	42.5	5.58	1.0
Fairbluff				3.20	6.5
Fayetteville	71	12	44.0	1.86	1.0
Goldsboro	67	12	41.8	2.51	
Greensboro	66	9	38.7	3.16	T.
Henderson	67	9	40.6	3.35	1.5
Hendersonville	65	4	36.6	3.94	T.
Henrietta	73	7	41.0	3.09	
Highlands	56	−2	31.9	5.82	T.
Horse Cove	61	3	38.4	4.28	T.
Kinston	68	10	43.0	5.00	2.0
Linville	54	−3	30.3	2.63	2.0
Littleton	69	8	39.0	3.01	2.0
Louisburg	66	11	40.8	2.77	3.5
Lumberton	65	17	42.8	2.85	6.0
Mana				2.13	
Marion	70	4	38.8	3.59	T.
North Carolina—Cont'd.					
Marshall	65	−3	38.8	1.26	1.1
Mocksville	68	8	40.4	3.40	T.
Moncure	65	10	42.0	1.75	3.0
Monroe	68	5	40.2	1.84	3.0
Mountairy	62	6	37.0	2.35	
Mount Pleasant	67	8	40.8	2.11	0.8
Murphy				3.55	1.0
Newbern	72	11	45.6	5.84	T.
Oakridge		8		3.17	T.
Patterson*[1]	64	5	34.1	2.70	
Pittsboro'	67	4	40.0	2.38	3.0
Rockingham	66	10	42.4	1.94	1.0
Roxboro	65[c]	4	39.0[d]	2.47	0.5
Salem	66	7	37.4	4.18	
Salisbury	67	9	40.4	3.22	0.8
Saxon	68	8	38.6	3.39	
Selma	67	11	41.2	3.30	5.0
Settle	60	4	35.2	2.82	
Sloan	69	14	45.6	6.21	T.
Soapstone Mount	62	4	37.4	2.58	0.5
Southern Pines *b*	68	10	42.3	1.68	3.0
Southport	68	15	48.0	5.66	T.
Springhope*[1]	61	12	39.2	2.89	2.0
Tarboro	71	8	42.0	4.41	3.5
Waynesville	61	0	35.2	2.38	T.
Weldon *a*	65	8	38.6	2.69	2.0
Weldon *b*				2.54	1.8
North Dakota.					
Amenia	54	−25	14.5	0.08	0.8
Ashley	53	−26	16.5	0.35	1.0
Berlin	63	−28	14.4	0.22	2.0
Buxton		−24		0.04	0.8
Churchs Ferry	52	−24	11.6	0.15	1.5
Coalharbor	53	−23	18.0	T.	T.
Devils Lake	52	−23	13.2	0.05	0.5
Dickinson	56	−16	25.4	0.21	1.5
Donnybrook				T.	T.
Dunseith	45	−28	10.8	0.20	2.0
Ellendale	63	−21	19.6	T.	T.
Falconer	52	−22	18.6	0.15	2.2
Fargo	52	−25	14.1	0.45	4.5
Forman	53	−23	16.2	0.35	3.5
Fort Yates		−20		0.11	1.0
Fullerton[1]	60*	−24	16.1	0.21	2.0
Gallatin	48	−28	11.3	0.43	4.3
Glenullin	55	−20	19.0	0.52	2.7
Grafton	49	−24	9.4	0.07	0.7
Hamilton	50	−26	9.8	0.78	8.5
Hannaford	48	−28	15.0	0.30	3.0
Jamestown	54	−24	16.8		
Larimore	48	−25	12.0	0.15	1.5
McKinney	53	−27	14.0	0.20	2.0
Mayville	53	−20	17.2	0.10	1.0
Medora	70	−18	25.0	0.10	1.0
Melville	48	−23	16.7	0.27	2.5
Milton	40	−28	9.0	0.20	2.0
Minnewaukon	50	−26	12.2	0.07	1.0
Minot	52	−22	17.4	0.05	0.5
Minto	53[c]	−30[j]	10.8[e]		
Napoleon	50	−24	16.8	0.21	1.2
New England	47	−18	20.0	0.23	2.3
Oakdale	59	−22	24.5	T.	T.
Pembina	47	−30	9.1	0.90	9.0
Portal	46	−25	14.4	0.25	2.5
Power	55	−30	16.0	0.22	3.2
St. John	52	−24	13.7	0.20	2.0
Sheyenne	48	−25	13.2		
Steele	47	−25	16.1	0.32	3.2
Towner	51	−27	12.0	0.50	5.0
University	50	−24	13.3	0.11	1.1
Wahpeton	51	−24	17.3	0.40	4.0
Willow City	48	−25	12.6	T.	T.
Woodbridge		−30		0.08	0.8
Ohio.					
Akron	54	−6	29.8	1.95	1.9
Annapolis	56	−6	31.3	2.26	2.0
Ashland	53	−6	28.2	1.63	3.3
Ashtabula	51	0	29.3	3.30	10.5
Atwater				2.50	4.0
Bangorville	56	−11	28.4	2.53	3.8
Bellefontaine	55	−6	29.6	1.60	
Bement				1.19	2.6
Benton Ridge	55	−4	29.9	1.67	4.8
Bethany	61	−2	33.0	3.41	
Bigprairie	56	−3	29.6	3.28	0.9
Binola				2.54	4.0
Bladensburg	55	−8	29.6	2.65	3.8
Bloomingburg	60	−3	33.4	3.17	
Bowling Green	56	−3	29.4	0.97	3.1
Bucyrus				0.60	2.0
Cambridge	57	−9	31.4	2.11	2.0
Camp Dennison	59	−1	34.1	2.53	0.3
Canal Dover	56	−5	31.0	2.34	2.0
Canton	54	−4	30.8	2.43	5.0
Cardington	55	−4	30.4	2.36	2.0
Cedarville				3.55	1.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Ohio—Cont'd.					
Celina	57	− 6	30.6	1.58	0.5
Circleville	60	− 2	32.0	1.93	0.7
Clarksville	60	− 2	33.6	3.04	1.0
Cleveland *a*	54	− 1	30.9	2.72	4.0
Cleveland *b*	54	− 1	30.0	2.19	1.2
Coalton	61	− 1	34.2	2.72	1.0
Colebrook	51	− 7	27.5	2.39	7.0
Dayton *a*	......	......	......	3.00	T.
Dayton *b*	61	− 2	33.8	3.16	1.3
Defiance	56	− 4	28.4	1.20	0.5
Delaware	58	− 2	31.6	2.59	1.9
Demos	55	− 3	29.9	3.08	1.0
Dupont	57	− 6	29.8	0.35	1.0
Elyria	55	− 1	29.7	2.15	1.4
Findlay	57	− 3	30.5	1.70	5.0
Frankfort	60	− 6	32.7	2.94	0.5
Garrettsville	54	−11	29.4	2.67	5.0
Granville	58	− 7	30.9	2.85	4.0
Gratiot	56	− 8	31.0	2.79	5.8
Greenfield	58	2	34.6	2.70	1.0
Greenhill	56	−18	29.0	1.80	3.1
Greenspring	54	− 2	31.3	1.70	2.4
Greenville	56	− 2	31.2	3.14	0.5
Hanging Rock	60	2	35.5	3.20	1.5
Hillhouse	52	− 6	27.9	3.11	15.0
Hillsboro	54	− 5	31.3	2.60	1.5
Hiram	56	− 8	27.8	2.74	4.5
Hudson	58	−12	28.7	2.83	8.0
Jacksonboro	63	1	32.4	2.54	T.
Kenton	58	− 4	32.0	3.11	6.0
Killbuck	54	− 5	30.6	1.84	1.5
Lancaster	59	− 4	33.0	2.29	3.5
Logan	65	− 8	36.0	3.12	3.0
Lordstown	50	− 9	27.4	2.03	4.5
Lowell	61	− 2	34.3	4.81	1.0
McArthur	60	− 3	32.9	2.31	1.0
McConnelsville	62	− 4	34.3	2.73	T.
Mansfield	......	......	......	2.89	4.3
Marietta	60	3	36.8	2.88	0.9
Marion	56	− 3	32.1	3.35	1.0
Medina	55	− 8	29.7	2.22	3.0
Milfordton	52	−11	27.7	2.24	6.0
Milligan	60	− 5	32.7	2.11	3.0
Millport	56	−20	28.9	2.43	4.8
Napoleon	56	− 8	26.5	0.65	2.0
Neapolis	......	......	......	1.68	1.5
New Alexandria	56	− 3	31.8	2.02	T.
New Berlin	53	− 8	29.3	1.54	1.5
New Bremen	56	− 6	31.2	1.12	....
New Holland	58	− 2	32.4	3.13	2.0
New Paris	58	− 4	31.8	2.43	T.
New Richmond	62	− 1	34.7	2.37	1.5
New Waterford	55	− 5	30.6	2.24	4.8
North Lewisburg	53	− 4	29.1	2.97	2.0
North Royalton	53	− 6	29.2	2.80	3.5
Norwalk	55	− 3	31.1	2.18	1.0
Oberlin	55	− 3	30.7	2.20	....
Ohio State University	58	− 1	32.6	2.78	0.8
Orangeville	50	− 8	28.4	2.22	5.0
Ottawa	57	− 4	30.6	1.42	1.5
Pataskala	55	− 8	30.6	2.92	5.6
Philo	58	− 6	30.6	2.03	2.7
Plattsburg	57	− 5	31.2	2.91	T.
Pomeroy	60	2	35.7	1.83	0.5
Portsmouth *a*	......	......	......	2.90	1.0
Portsmouth *b*	65	2	36.2	2.89	1.2
Richwood	57	− 4	30.0	2.16	1.2
Ridgeville Corners	55	− 5	29.6	0.91	1.5
Ripley	55	− 5	33.7	2.41	1.8
Rittman	59	− 2	31.5	2.16	1.0
Rockyridge	55	− 3	29.8	1.61	2.2
Rosewood	54	− 4	31.4	2.62	T.
Shenandoah	55	− 7	29.6	2.08	1.4
Sidney	54	− 4	30.6	2.94	2.6
Sinking Spring	56	− 3	32.8	2.95	5.0
Somerset	......	......	......	2.26	0.5
Springboro	......	......	......	3.21	....
Strongsville	......	......	......	3.02	2.0
Thurman	67	− 3	36.0	1.81	1.0
Tiffin	58	− 1	31.0	2.19	3.5
Upper Sandusky	55	− 3	30.2	2.69	3.0
Urbana	54	− 2	31.0	3.14	1.6
Vanceburg	61	0	33.7	2.90	2.5
Vermillion	55	− 3	30.0	2.11	2.0
Vickery	54	− 2	29.9	1.74	0.8
Walnut	......	......	......	2.00	1.4
Warren	59	− 6	30.2	2.52	9.5
Warsaw	59	−11	31.0	2.13	1.8
Wauseon	56	− 4	28.6	1.50	3.1
Waverly	61	− 2	33.8	2.90	0.9
Waynesville	59	− 3	32.8	3.10	1.5
Wellington	54	− 2	30.0	2.29	3.0
Westerville	57[c]	0[c]	32.5[c]	2.63	T.
Willoughby	......	......	......	2.81	3.5
Wooster	54	− 5	30.2	2.78	4.0
Youngstown	......	......	......	1.97	1.8

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Ohio—Cont'd.					
Zanesville	......	......	......	2.05	3.0
Oklahoma.					
Arapaho	66	9	40.8	0.77	T.
Beaver	66	10	38.9	0.48	0.5
Burnett	71	7	41.0	0.63	1.0
Edmond	61[1]	13	40.4[c]	0.30	T.
Fort Reno	66	9	39.6	0.35	T.
Fort Sill	82	10	42.9	0.27	0.2
Guthrie	63	12	41.0	0.76	1.0
Hennessey	64	8	40.8	1.00	2.0
Hopeton	70	8	39.3	0.32	0.5
Jefferson	68	7	38.2	0.28	
Kingfisher	67	11	41.8	0.53	T.
Mangum	74	12	43.4	0.50	T.
Newkirk	61	10	38.2	0.53	T.
Norman	66	12	41.4	0.50	0.5
Pawhuska	68	11	41.9	0.53	1.0
Perry	67	10	42.0	0.26	0.5
Prudence	70	9[c]	41.8	0.69	1.2
Sac and Fox Agency	68	9	40.6	0.75	T.
Stillwater	65	11	41.8	0.23	0.1
Waukomis	66	14	41.2	0.60	T.
Winnview	63[c]	10[c]	40.2[c]	0.78	0.5
Woodward	70	5	39.6	0.54	0.4
Oregon.					
Albany *a* *[1]	60	26	43.0	4.73	
Albany *b*	......	......	......	4.00	
Alpha	60	25	44.2	12.71	
Arlington	64	32	50.2	1.02	
Ashland *b*	62	25	43.4	2.57	
Aurora *[1]	62	28	44.2	3.38	
Aurora (near)	61	25	42.5	3.86	
Bandon	61	30	49.2	8.73	
Bay City	60	28	45.1	12.00	
Blalock	55	23	39.6	1.55	
Brownsville *[1]	65	28	44.6	5.32	
Bullrun	52	30	40.6	8.89	
Burns	48	15	31.6	T.	
Burns (near)	61	13	37.8	1.27	
Cascade Locks	55	30	41.8	11.06	
Comstock *[1]	59	30	44.7	7.12	
Coquille	......	......	......	6.71	
Corvallis	61	21	42.3	4.74	
Dayville	65	11	39.2	1.34	0.2
Ella	......	......	......	0.92	
Eugene	65	27	44.0	5.38	
Fairview	58	30	47.1	9.74	
Falls City	56	26	41.1	9.66	
Forestgrove	60	24	40.6	5.74	
Gardiner	60	32	47.1	11.76	
Glenora	54	26	41.6	17.75	
Government Camp	53	9	35.4	10.25	22.0
Grants Pass	64	25	43.2	4.30	
Happy Valley	60	10	35.0	1.67	1.5
Heppner	63[c]	13[c]	40.0[c]	1.37	
Jacksonville	56	26	41.8	2.42	
Joseph	52	2	29.0	0.92	7.0
Junction City *[1]	64	28	44.8	4.92	
Kerby	63	20	41.9	7.74	
Klamath Falls [f]	78	21	39.4	......	
Lafayette *[1]	56	25	42.0	8.66	
Lagrande	52	12	34.9	......	
Lakeview	53	17	36.4	1.44	
Lonerock	67	2	34.4	1.95	1.2
McMinnville	58	26	42.4	5.80	
Merlin *[1]	62	28	44.2	8.44	
Monmouth *a* *[1]	61	29	43.0	4.81	
Monmouth *b*	58	24	42.8	4.28	
Monroe	59	23	43.6	5.76	
Mount Angel	61	26	43.0	5.21	
Nehalem	......	......	......	16.63	
Newberg	63	27	42.7	5.20	T.
Newbridge	50	7	31.6	0.79	1.0
Newport	62	30	47.4	12.31	
Pendleton	61	18	41.0	1.48	
Placer	......	......	......	4.97	
Prineville	65	12	36.2	0.84	2.0
Riddles *[1]	62	30	43.1	3.92	
Riverside	53	......	......	0.87	
Salem	60	23	43.4	4.15	
Sheridan *[1]	55	25	39.9	5.15	
Silverlake	69	9	35.6	0.80	T.
Silverton *[1]	64	26	43.2	4.59	T.
Siskiyou *[1]	48	28	38.0	1.95	
Sparta	48	10	30.5	1.95	12.0
Springfield *[1]	59	29	42.9	3.67	1.0
Stafford	61	27	42.6	4.95	
The Dalles	55	20	39.2	1.90	
Toledo	68	27	46.2	9.85	
Umatilla	......	......	......	0.83	
Vale	46	11	30.6	0.85	
Vernonia	60	23	43.2	6.77	T.
Westfork *[1]	52	30	40.4	3.44	
Weston	61	15	40.2	1.55	T.
Williams	62	23	42.2	3.63	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Pennsylvania.					
Altoona	53	0	28.6	2.21	......
Aqueduct	61	4	33.4	2.71	3.3
Athens	54	4	27.8	1.59	4.0
Beaver Dam	......	......	......	1.90	T.
Brookville	......	......	......	1.84	5.8
Browers Lock	......	......	......	3.81	......
Butler	50	− 8	29.0	3.21	9.7
Carlisle	......	......	......	2.34	2.0
Cassandra	50	− 2	29.0	2.96	8.5
Cedarrun	......	......	......	3.75	18.0
Centerhall	49	4	29.9	1.95	6.5
Chambersburg	59	5	31.1	1.95	......
Coatesville	63	0	32.2	3.28	3.5
Confluence	59	− 1	29.6	2.44	1.9
Coopersburg	61	4	32.6	3.31	4.5
Davis Island Dam	......	......	......	2.38	T.
Derry Station	53	− 2	30.6	3.09	6.0
Driftwood	......	......	......	2.78	......
Duncannon	......	......	......	2.24	2.5
Dushore	58	0	37.4	1.97	2.3
Dyberry	47	− 3	24.2	2.76	13.7
East Bloomsburg	......	......	......	1.67	8.0
East Mauch Chunk	56	1	28.4	3.37	7.0
Easton	53	3	30.0	3.72	6.0
Ellwood Junction	......	......	......	2.01	2.0
Emporium	48	− 4	27.0	3.16	9.7
Ephrata	55	5	31.9	2.31	2.2
Everett	54	2	30.0	2.10	......
Farrandsville	......	......	......	1.95	5.0
Franklin	55	− 7	29.6	1.94	3.0
Freeport	......	......	......	2.66	1.5
Girardville	......	......	......	2.65	5.5
Grampian	46	− 4	27.0	3.21	7.0
Greensboro	54	......	......	2.21	2.3
Hamburg	......	......	......	3.50	5.5
Hamilton	52	1	25.4	3.03	12.0
Hawley	......	− 5	......	2.46	10.6
Hawthorn	51	− 2	29.4	3.35	3.7
Hews Island Dam	......	......	......	1.84	......
Huntingdon *a*	55	5	31.0	2.04	1.5
Huntingdon *b*	......	......	......	1.07	2.0
Irwin	......	......	......	2.40	0.2
Johnstown	53	2	31.6	3.38	6.9
Karthaus	......	......	......	1.94	3.0
Keating	......	......	......	2.01	6.0
Kennett Square	54	3	32.6	4.27	2.0
Lawrenceville	51	0	25.2	3.48	3.2
Lebanon	55	7	30.8	2.81	4.8
Leroy	53	2	26.8	1.94	5.8
Lewisburg	52	8	30.2	2.33	6.2
Lockhaven *a*	55	5	31.2	2.49	9.0
Lockhaven *b*	......	......	......	2.40	......
Lock No. 4	......	......	......	2.25	0.2
Lycippus	55	− 3	30.4	2.49	6.1
Mifflin	......	......	......	0.70	1.0
Nisbet	......	......	......	1.10	5.2
Oil City	......	......	......	2.77	6.7
Parker	......	......	......	2.67	4.0
Philadelphia	58	13	35.5	3.35	1.4
Quakertown	54	− 4	30.0	3.68	6.5
Reading [2]	......	......	29.2	2.62	......
Renovo *a*	......	......	......	2.61	1.0
Renovo *b*	50	3	29.8	2.62	5.9
Saegerstown	50	− 6	28.2	2.71	6.9
St. Marys	46	− 4	26.0	2.29	11.7
Scranton	54	6	29.6	2.13	10.0
Selinsgrove *a*	52	9	30.5	2.60	4.5
Shawmont	......	......	......	2.92	2.5
Sinnamahoning	......	......	......	0.94	2.6
Smethport	49	− 8	26.0	2.52	10.0
Somerset	54	− 4	27.0	3.44	8.2
South Eaton	52	7	29.7	2.10	5.5
State College	48	1	29.4	1.65	4.3
Sunbury	......	......	......	0.60	4.0
Swarthmore	57[c]	12[c]	32.7[c]	3.22	3.0
Towanda	54	6	28.8	1.36	3.0
Troutrun	......	......	......	4.58	7.5
Uniontown	53	3	33.8	2.32	2.5
Warren	49	− 7	27.4	4.37	13.2
Wellsboro	50	2	28.1	3.04	8.0
Westchester	57	6	32.2	3.76	3.8
West Newton	......	......	......	2.54	3.0
Westtown	56	3	30.9	2.43	2.0
Wilkesbarre	55	8	30.8	1.98	5.0
Williamsport	52	6	29.2	2.31	5.6
York	57	7	30.6	2.12	2.0
Rhode Island.					
Bristol	56	11	31.1	3.81	7.2
Kingston	57	2	29.0	5.14	9.0
Pawtucket	53	− 3	25.2	4.72	7.5
Providence *a*	60	11	31.2	4.20	7.5
Providence *c*	60	8	29.6	4.38	7.0
South Carolina.					
Allendale	68	15	44.7	2.20	3.0
Batesburg	69	12	44.0	2.05	0.8
Beaufort	75	23	51.0	3.06	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	Ins.	Ins.
Blackville	72	13	45.7	1.73	3.3
Calhoun Falls	......	......	......	2.52	
Camden	......	......	......	1.85	3.9
Cheraw *a*	66	14	40.5	1.28	2.5
Cheraw *b*	......	......	......	1.68	5.5
Clemson College	68	8	41.1	2.80	
Conway	......	......	......	3.32	6.5
Darlington	......	......	......	1.82	2.5
Edisto	......	......	......	2.18	3.1
Effingham	......	......	......	1.85	4.0
Florence	65	13	44.0	1.91	0.3
Gaffney	......	......	......	3.46	0.9
Georgetown	70	18	45.8	5.65	
Gillisonville	69	16	47.3	2.24	T.
Greenville	68	8	39.4	2.88	
Greenwood	67	10	41.0	2.16	
Holland	66	6	39.2	2.70	
Kingstree *a*	67	14	43.8	2.62	5.2
Kingstree *b*	......	......	......	2.62	5.7
Liberty	68	3	39.0	3.25	
Little Mountain	69	11	44.3	1.84	0.5
Longshore	71	9	43.2	2.02	T.
Pinopolis *[1]	66	20	47.0	2.69	0.2
St. Georges	60	12	44.6	2.02	4.2
St. Matthews	74	11	44.9	1.97	4.6
St. Stephens	......	......	......	2.70	5.0
Santuck	69	8	41.8	1.94	T.
Shaws Fork	......	......	......	1.69	T.
Smiths Mills	......	......	......	3.42	6.0
Societyhill	65	15	44.0	1.63	3.0
Spartanburg	71	10	39.6	2.74	
Statesburg	71	14	46.8	1.56	1.3
Summerville	72	17	47.6	3.31	1.5
Temperance	71	13	45.4	2.27	4.6
Trenton	66	15	47.2	2.00	1.0
Trial	70	11	43.4	2.23	......
Walhalla	68	5	39.6	2.86	
Winnsboro	74	11	43.2	1.61	0.1
Winthrop College	68	9	43.1	1.69	0.3
Yemassee	69	18	47.5	2.89	3.0
Yorkville	71	12	44.9	2.29	0.2
South Dakota.					
Aberdeen	58	−20	18.8	T.	T.
Academy	65	−12	27.4	0.01	T.
Alexandria	66	−19	24.9	T.	T.
Armour	62	−18	24.2	0.06	T.
Ashcroft	62	−22	28.7	0.07	0.7
Bowdle	64	−24	21.2	T.	T.
Brookings	60	−20	18.2	0.02	0.2
Canton	59	−18	23.5	0.11	0.8
Centerville	......	......	......	0.15	1.9
Chamberlain	68	−15	27.4	T.	0.0
Clark	60	−22	21.8	0.14	1.4
Desmet	58	−21	19.9	0.44	3.0
Doland	58	−25	19.6	0.49	4.2
Elkpoint	64	−12	27.5	T.	T.
Farmingdale	......	......	......	0.11	2.0
Faulkton	63	−19	21.7	0.16	1.0
Flandreau	60	−20	21.9	0.15	1.5
Forestburg	62	−22	21.8	0.02	0.2
Forest City	56	−16	23.4	T.	T.
Fort Meade	64	−11	32.8	0.50	4.0
Gary	55	−18	23.4	0.64	2.2
Greenwood	64	−10	28.6	0.01	T.
Hartman	60	−21	21.1	T.	T.
Highmore	......	......	......	T.	T.
Hotch City	66	......	......	T.	T.
Hot Springs	60	......	......	0.10	1.0
Howard	60	−25	21.0	......	
Interior	60	−12	28.8	0.05	0.5
Ipswich	65	−20	19.2	0.09	0.7
Kimball	63	−16	25.4	0.16	0.5
Leola	65[c]	−24[c]	18.0[c]	0.08	0.8
Leslie	64	−14	24.2	......	......
Mellette	60	−24	19.6	T.	T.
Menno	62	−14	24.0	0.07	0.4
Millbank	63	−20	18.9	0.25	2.5
Mitchell	64	−18	23.9	0.00	
Oelricks	63	−12	31.0	0.20	2.0
Parker	60	−17	23.8	0.01	0.2
Plankinton	58	−19	22.6	0.10	0.0
Redfield	64	−22[d]	23.0	0.09	1.2
Rosebud	60	−12	22.6	0.20	2.0
St. Lawrence	67	−20	24.0	T.	T.
Shiloh	61	−20	22.7	T.	T.
Silver City	......	......	......	0.35	3.5
Sioux Falls	59	−15	20.0	T.	T.
Spearfish	63	− 8	33.6	0.66	7.8
Tyndall	59	−16	24.6	T.	T.
Watertown	56	−22	18.4	0.15	1.5
Waubay	55	−20	18.0	0.22	2.2
Wessington Springs	......	−20	......	0.10	1.0
Wolsey	......	......	......	0.10	0.5
Tennessee.					
Andersonville	68	1	36.8	3.77	0.2
Ashwood	66	8	41.0	3.03	T.
Tennessee—Cont'd.	°	°	°	Ins.	Ins.
Benton	68	3	39.4	4.37	
Bluff City	......	......	......	1.31	1.0
Bolivar	67	10	41.6	2.47	T.
Bristol	60	− 8	33.8	1.37	T.
Byrdstown	64	− 1	37.7	2.91	0.7
Carthage	......	......	......	3.01	0.2
Charleston	......	......	......	3.70	T.
Clarksville	67	6	39.8	4.36	0.5
Clinton	......	......	......	2.44	1.0
Covington	69[f]	15[f]	44.6[f]	1.69[f]	
Decatur	66	3	38.4	3.99	T.
Elizabethton	64	− 4	35.8	2.23	3.7
Elk Valley	60	0	34.4	1.65	T.
Erasmus	64	−10	35.5	3.23	0.6
Florence	66	5	39.6	2.83	T.
Franklin	68	7	39.6	2.68	T.
Grace *[1]	64	8	37.9	3.90	T.
Greeneville	63	− 3	36.2	2.04	0.2
Harriman	66	5	38.0	3.77	T.
Hohenwald	67	2	38.7	2.61	0.4
Iron City	68	5	39.6	4.98	
Jackson	66	10	41.4	......	
Johnsonville	68	2	40.2	1.83	0.1
Jonesboro *[1]	60	− 3	34.2	2.53	1.1
Kingston	......	......	......	3.81	......
Lewisburg	68	7	40.2	3.36	T.
Liberty	65	1	36.4	3.60	T.
Lynnville	68	8	40.2	3.45	T.
McMinnville	66	5	40.6	3.10	T.
Maryville *[5]	66	5	38.9	3.60	1.2
Newport	67	1	37.4	2.10	T.
Nunnelly	67	3	40.8	2.52	
Oakhill	65	0	39.8	3.81	2.9
Palmetto	65	7	40.8	3.45	0.2
Pope	68	0	37.6	2.52	T.
Rogersville	62	− 2	35.6	3.00	0.2
Rugby	64	− 7	35.9	2.55	T.
Savannah	66	10	41.4	2.37	T.
Sewanee	61	3	38.1	4.47	1.5
Silverlake	56	− 8	32.2	1.38	0.2
Springdale	65	− 4	36.8	3.07	T.
Springfield	70	4	39.6	3.30	T.
Sylvia	64	1	39.8	3.23	0.8
Tazewell	......	......	......	3.32	4.5
Tellico Plains	67	6	39.6	2.97	T.
Tracy City	64	1	36.8	3.43	1.0
Tullahoma	65	4	38.7	3.55	2.0
Union City	65	9	40.0	2.00	T.
Wildersville	66	8	42.0	2.56	0.5
Yukon	66[i]	7[i]	41.9[i]	4.83	T.
Texas.					
Albany *[1]	68	22	46.3	0.47	
Alvin	......	......	......	9.13	
Anna	74	5	45.2	1.06	0.4
Anson	......	......	......	0.65	T.
Austin *a*	75	18	49.6	4.30	
Austin *b* *[5]	76	16	48.4	......	
Ballinger	73	15	45.6	0.57	0.2
Beaumont	75	27	51.4	5.00	
Beeville	86	26	57.2	2.25	
Big Springs	......	......	......	0.56	T.
Blanco	78[c]	20[c]	52.2[c]	3.85	
Boerne *[1]	71	20	48.9	5.31	
Brazoria	76	26	54.4	5.23	
Brenham	75	21	51.7	4.90	
Brighton	75	30	57.0	2.63	
Brownwood	86	17	51.6	2.20	
Burnet *[1]	70	7	48.2	2.25	
Camp Eagle Pass	76	29	53.4	2.08	
Coleman	80	17	50.2	0.60	
College Station	......	20	......	4.55	
Colorado	......	......	......	0.25	
Columbia	75	24	52.8	5.56	
Conroe	70	21	51.0	5.12	
Corsicana	73	16	48.7	3.05	T.
Cuero	75	23	53.9	4.92	
Dallas	76	18	45.4	3.46	0.5
Danevang	76	24	54.8	7.55	
Dublin	75	15	45.6	1.21	
Duval	81	18	51.4	3.84	
Emory	73	13	48.4	3.10	T.
Estelle	80	11	47.0	2.17	0.5
Forestburg	......	......	......	0.79	T.
Fort Brown	78	......	......	2.43	
Fort Clark	72	25	51.8	1.91	
Fort McIntosh	80	30	56.4	2.61	
Fort Ringgold	79	35	58.9	T.	
Fort Stockton	......	......	......	1.54	
Fredericksburg *[1]	73	18	47.6[c]	2.38	
Fruitland	79	11	45.2	0.47	T.
Gainesville	75	15	44.8	1.21	
Georgetown	......	......	......	4.91	
Grapevine	80	11	46.6	1.07	1.0
Hale Center	74	19	45.8	0.10	T.
Hallettsville	75	23	53.7	5.80	
Henrietta	68	12	45.0	0.35	T.
Texas—Cont'd	°	°	°	Ins.	Ins.
Hewitt	......	......	......	3.65	0.2
Hondo	......	......	......	4.67	
Houston	......	25	......	7.26	
Hulen	......	25	......	5.20	
Huntsville	73	19	50.6	5.19	
Jacksonville	75	16	49.2	4.79	T.
Jasper	83	21	53.4	3.00	
Kaufman	74	16	49.2	......	......
Kent	......	......	......	1.34	T.
Kerrville	77	12	47.3	2.32	
Lampasas	76	16	48.6	2.58	
Langtry	71	29	52.0	1.47	
Lapara	......	......	......	3.85	
Laureles Ranch	......	......	......	2.05	
Llano *[5]	72	23	51.4	3.15	
Longview	74	16	47.3	3.39	T.
Luling	74	20	52.0	4.10	
Mann	80	15	48.5	3.74	T.
Marathon	72	17	44.6	0.45	
New Braunfels	73	22	52.6	4.00	
Panter	76	20	49.8	0.95	
Paris *b* *[1]	72	16	48.1	......	0.2
Point Isabel *[1]	78	42	63.4	0.20	
Rhineland	75	18	44.4	0.62	T.
Rockisland	75	22	52.1	5.46	
Rockport *[1]	68	32	56.0	......	
Runge	77	23	54.0	2.31	
Sabine	69	22	52.6	3.19	
Sanderson	70	22	48.8	0.78	
San Marcos	74	19	51.2	4.83	
Sherman	75	16	47.2	1.53	T.
Sugarland	76	23	53.6	7.62	
Sulphur Springs	72	14	47.0	2.25	T.
Temple *a*	74	16	48.4	3.37	
Temple *b*	72	13	46.6	2.98	......
Turnersville	74	16	49.4	......	
Tyler	71	13	45.7	3.49	......
Valentine	70	......	......	0.09	T.
Victoria	......	......	......	7.62	
Waco	75	19	49.0	3.00	T.
Waxahachie	75	11	46.2	3.80	T.
Weatherford	76	13	46.0	0.92	T.
Wichita Falls	......	......	......	0.03	
**Utah.*					
Alpine	......	......	......	0.20	1.0
Bluecreek *[1]	50	5	31.6	0.53	2.5
Brigham	......	......	......	1.12	5.5
Castledale	55	10	33.6	0.00	
Cisco	51	10	29.6	T.	T.
Corinne	58	4	34.7	0.06	T.
Deseret	54	11	32.5	0.36	0.0
Fillmore	58	5	34.3	1.25	
Fish Springs	55	16	34.6	0.05	
Fort Duchesne	45	−10	16.6	0.35	3.0
Frisco	57	16	36.2	0.11	
Giles	53	4	30.0	0.29	2.0
Grover	49	3	30.2	0.20	2.0
Heber	46	4	27.8	1.06	4.0
Huntsville	......	......	......	1.08	3.0
Kanab	......	......	......	0.10	
Kelton *[1]	45	12	32.6	0.20	2.0
Levan	49	8	31.9	0.87	3.0
Loa	53	1	27.8	T.	T.
Logan	49	4	30.2	0.56	
Manti	51	4	32.2	0.61	4.0
Marysvale *[1]	48	12	26.5	1.00	7.0
Millville	......	......	......	0.49	......
Minersville	54	15	35.4	0.34	0.7
Moab	55	16	34.6	0.42	T.
Mount Pleasant	50	10	32.4	0.36	3.0
Ogden *a* *[1]	54	8	32.2	0.20	1.0
Pahreah	59	14	38.1	T.	T.
Park City	47	7	28.2	0.93	7.5
Parowan	54	10	34.0	0.51	3.4
Pinto	51	1	32.4	0.38	4.0
Promontory *[1]	56	10	29.4	0.15	1.5
Provo	60	16	37.0	0.45	
Richfield	52	2	28.0	0.45	3.0
St. George	66	12	40.4	0.05	
Scipio	54	0	32.6	1.04	4.0
Snowville	44	1	29.2	0.68	
Soldier Summit	46	− 4	23.8	0.50	5.0
Terrace *[1]	55	10	33.6	T.	T.
Thistle	60	12	33.0	0.30	1.5
Tooele	54	15	33.6	0.80	
Tropic	62	9	32.0	0.06	
Vernal	41	0	21.2	0.47	2.6
Woodruff	42	− 2	21.6	......	......
Vermont.					
Bennington	55	1	25.4	2.88	12.0
Brattleboro	52	−10	23.3	4.64	32.5
Burlington	50	0	22.2	3.32	28.0
Chelsea	49	−11	17.6	3.50	44.0
Cornwall	47	− 6	20.3	3.60	32.0
Derby	51	−10	15.7	3.70	......
Enosburg Falls	52	−12	18.2	3.30	24.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Vermont—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hartland	48	−15	18.0	4.48	35.9
Jacksonville	45	−10	18.1	5.33	21.1
Manchester	51	1	21.8	3.61	27.2
Norwich	46	−14	17.8	4.80	38.0
St. Johnsbury	49	−12	16.4	4.07	31.5
Vernon	.....	.....	.....	4.11	26.5
Wells	50	−3	19.8	3.49	35.5
Woodstock	44	−22	18.4	3.81	41.0
Virginia.					
Alexandria	61	9	35.9	1.95	1.3
Ashland	66	8	37.8	3.29	T.
Barboursville	65	1	34.8	4.17	T.
Bedford	59	5	33.1	4.39	
Bigstone Gap	62	−4	35.2	2.93	1.3
Birdsnest *[1]	64	8	38.8	2.20	3.0
Blacksburg	68	2	35.7	2.04	T.
Bon Air	65	9	38.8	2.54	T.
Buckingham	68	5	36.0	3.62	T.
Burkes Garden	53	−5	31.3	2.04	3.0
Callaville	63	7	39.0	3.16	0.5
Charlottesville	63	7	36.6	4.85	T.
Christiansburg	.....	.....	.....	2.09	0.5
Cliftonforge	55	7	31.8	1.78	
Columbia	64	10	37.2	3.00	
Dale Enterprise	64	1	34.0	3.20	T.
Doswell	62	10	39.0	.....	.....
Dwale	62	2	35.0	4.64	1.0
Fredericksburg	63	10	35.6	3.16	1.0
Grahams Forge [f]	57	−2	31.6	1.36	T.
Hampton	59	16	41.5	2.11	0.5
Hot Springs	55	−2	31.6	2.31	T.
Lexington	62	7	34.9	2.92	
Manassas	61	6	35.0	2.24	T.
Marion	60	−5	33.4[d]	1.40	T.
Meadowdale	51	0	30.2	1.51	0.2
Miller School	62	10	34.2	3.79	
Newport News	61	24	42.4	1.68	T.
Petersburg	66	9	39.5	2.95	T.
Quantico	62	1	31.2	.....	.....
Radford	.....	.....	.....	1.02	1.0
Rockymount	62	7	36.5	5.08	
Salem	75	8	40.6	3.73	
Scottsburg	62	9	38.6	2.14	T.
Speers Ferry	.....	.....	.....	3.41	T.
Spottsville	65	10	39.6	2.20	1.0
Stanardsville	63	8	35.4	3.88	
Staunton	65	10	37.4	3.01	
Stephens City	63	5	34.5	1.94	0.5
Sunbeam	68	10	41.0	2.41	2.0
Tobaccoville	.....	3	.....	2.84	T.
Warrenton	62	11	36.7	1.58	1.0
Warsaw	63	8	36.7	2.45	
Westpoint	68	8	37.8	1.85	
Woodstock	64	7	33.6	1.75	T.
Washington.					
Aberdeen	61	29	41.8	11.91	T.
Anacortes	.....	.....	.....	2.68	
Ashford	.....	.....	.....	8.16	6.0
Bremerton	59	27	42.6	4.80	
Bridgeport	71	12	37.8	0.70	
Brinnon	58	29	41.0	8.06	
Cedar Lake	.....	.....	.....	11.44	3.0
Cedonia	43	9	30.1	1.41	7.4
Centerville	60	17	38.7	1.94	T.
Chehalis	58	25	41.7	4.02	
Cheney	.....	.....	.....	0.25	
Clearwater	56	27	40.8	18.18	1.4
Cle Elum	52	9	33.2	4.75	5.5
Colfax	59	17	37.0	2.24	
Colville	.....	19	.....	1.56	7.5
Conconully	54	9	31.0	0.55	5.1
Connell	.....	.....	.....	0.26	
Coulee City	47	17	33.8	0.65	T.
Coupeville	55	28	42.0	2.05	
Crescent	48	11	32.6	1.95	2.5
Dayton	58	9	39.6	2.03	
Ellensburg	49	12	33.3	0.97	
Ellensburg (near)	48	10	33.6	0.60	0.2
Grandmound	58	25	41.2	4.83	
Hooper	60	18	39.2	0.72	
Kennewick	62	11	39.6	0.76	
Lacenter	61	23	41.6	6.85	
Lakeside	50	17	33.0	1.15	3.5
Lind	56	12	36.0	0.68	0.3
Loomis	47	11	31.0	0.60	6.0
Mayfield	65	32	46.6	7.50	
Montecristo	49	18	36.4	13.80	21.8
Mottinger Ranch	58	22	39.7	0.78	
Mount Pleasant	58	28	43.2	6.88	
Moxee Valley	52	11	34.0	0.51	T.
New Whatcom	62	24	44.2	3.63	
Northport	42	−1	28.4	2.34	17.0
Olga	58	29	43.0	4.25	
Olympia	59	25	42.6	5.96	
Pinehill	55	21	38.2	3.07	T.
Pomeroy	56	20	40.2	1.60	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Port Townsend	56	30	43.6	1.55	
Pullman	53	18	36.4	3.03	
Republic	46	3	28.7	1.46	15.8
Ritzville	.....	.....	.....	0.25	0.5
Rosalia	56	15	36.2	1.92	0.2
Sedro	59	25	44.8	6.38	
Shoalwater Bay *[10]	59	32	44.6	.....	.....
Snohomish	58	21	43.0	3.65	
Southbend	60	31	45.0	9.56	
Sunnyside	58	11	35.6	0.57	
Twin	58	28	42.0	11.71	
Union	57	24	40.4	9.51	
Usk	45	8	32.2	3.21	16.4
Vancouver	61	25	42.2	4.00	
Vashon	62	30	42.4	4.33	
Waterville	58	7	27.8	0.50	3.0
Wenatchee (near)	48	14	32.1	1.50	7.8
Westsound	59	26	41.6	3.43	
West Virginia.					
Beckley	55	1	31.8	1.08	2.1
Beverly	65	−7	33.3	1.89	5.0
Bluefield	58	0	34.7	1.98	1.0
Buckhannon *b*	64	−5	33.2	2.04	6.5
Burlington	56	3	32.4	0.82	0.0
Central	64	−2	34.6	2.60	3.5
Charleston	.....	.....	.....	3.07	2.0
Dayton	65	−2	34.4	2.93	3.0
Eastbank	68	3	38.2	2.90	T.
Elkhorn	60	3	36.0	1.90	2.7
Fairmont	.....	.....	.....	2.49	2.5
Glenville	62	2	34.6	2.71	1.5
Grafton	64	1	34.0	2.17	3.0
Green Sulphur Springs	64	5	35.6	2.19	0.3
Hamlin	64	7	39.6	2.60	.....
Harpers Ferry	.....	.....	.....	2.43	1.5
Hinton *a*	.....	.....	.....	2.26	2.0
Hinton *b*	59	4	34.7	.....	.....
Huntington	62	4	34.6	3.06	0.7
Madison	70	6	36.8	3.13	1.1
Marlinton	56	−5	30.5	1.99	T.
Martinsburg	62	9	32.4	1.76	1.0
Morgantown	66	2	35.6	1.59	0.2
New Martinsville	65	4	35.2	3.29	1.5
Nuttallburg	61	−1	35.2	1.79	2.6
Oceana	60	−10	34.6	2.46	.....
Oldfields	58	3	30.8	1.49	.....
Parsons	62	−3	31.8	1.90	.....
Philippi *a*	67	−1	36.1	1.82	4.8
Point Pleasant	65	2	33.2	3.60	T.
Romney	58	7	34.6	1.47	T.
Rowlesburg	.....	.....	.....	2.80	8.0
Spencer	65	2	36.2	2.78	T.
Uppertract	58	2	34.5	1.50	T.
Wellsburg	56	−2	31.4	2.14	3.5
Weston *a*	.....	.....	.....	2.46	4.4
Weston *b*	65	1	36.9	.....	.....
Wheeling *a*	.....	.....	.....	2.23	1.7
Wheeling *b*	57	5	36.2	1.88	1.5
Wisconsin.					
Amherst	48	−15	21.4	0.60	6.0
Antigo	48[e]	−18[e]	19.0[e]	0.55	5.5
Barron	46	−24	17.4	1.16	9.0
Bayfield	46	−13	21.5	1.80	16.0
Beloit	50	−9	26.6	2.56	.....
Brodhead	50	−10	25.0	1.45	1.0
Butternut	48	−24	16.4	0.40	4.0
Chilton [d]	42	−16	20.4	0.20	T.
Citypoint	48	−22	19.2	0.38	5.0
Delavan	48	−11	25.2	2.34	1.0
Easton	45	−16	20.6	0.62	5.2
Eau Claire	47	−18	21.0	1.00	6.8
Florence	49	−13	20.3	0.50	5.0
Fond du Lac	.....	−12	.....	0.60	3.0
Grand River Locks	.....	.....	.....	0.64	10.0
Grantsburg	.....	−24	.....	0.77	6.4
Hartford	47	−14	24.0	1.54	6.2
Hartland	44	−11	24.4	2.36	6.2
Harvey	46	−10	23.8	1.47	5.4
Hayward	49	−23	19.5	1.53	15.3
Heafford	45	−19	18.6	0.18	1.9
Hillsboro	47	−16	21.4	1.17	9.0
Knapp	48	−21	18.5	0.31	3.1
Koepenick *[1]	46	−18	17.8	1.10	8.0
Lancaster	45	−14	21.4	0.91	4.0
Madison	44	−14	23.6	0.69	4.5
Manitowoc	45	−11	24.1	0.88	7.8
Meadow Valley	47	−17	19.9	0.52	4.5
Medford	47	−26	16.5	0.85	4.0
Menasha	.....	.....	.....	0.57	8.0
Neillsville	44	−19	18.6	1.00	2.0
New Holstein	42	−13	20.8	0.50	5.0
New London	47	−14	21.4	1.66	5.5
Oconto	48	−12	23.6	0.97	7.0
Osceola	44	−21	19.1	0.35	3.5
Oshkosh	43	−14	23.6	0.55	.....
Pepin	48	−18	20.6	0.89	5.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pine River	46	−16	21.9	0.59	6.6
Portage	43	−13	22.0	0.75	7.0
Port Washington	53	−14	24.7	1.80	6.0
Prairie du Chien	50	−12	25.0	0.73	5.2
Racine	57	−9	27.8	1.95	.....
Sharon	48	−11	23.6	1.61	3.0
Shawano	47	−12	21.0	0.52	4.0
Sheboygan	43	−12	25.0	1.26	6.2
Spooner	51	−22	21.2	1.60	13.0
Stevens Point	47	−17	21.3	0.35	3.7
Sturgeon Bay Canal *[10]	45	−10	23.4	.....	.....
Valley Junction	46	−18	21.0	0.41	4.2
Viroqua	44	−15	22.0	1.33	9.8
Watertown	45	−13	22.9	1.52	6.8
Waukesha	45	−13	24.2	1.43	5.5
Waupaca	45	−15	22.6	0.60	5.2
Wausau	46	−18	20.2	1.00	8.0
Wausaukee	48	−14	21.6	0.53	5.0
Westbend	48	−12	25.9	0.43	4.8
Westfield	44	−15	22.1	0.73	6.5
Whitehall	47	−18	21.3	0.65	7.0
Wyoming.					
Alcova	54	−10	33.0	0.07	0.8
Basin	42	−12	14.3	0.08	.....
Bedford	42	−10	22.0	0.93	5.0
Bigpiney	41	−9	18.4	0.05	0.5
Bitter Creek	60	−10	32.9	0.20	2.0
Buffalo	56	−10	25.2	0.13	1.3
Burlington	51	−11	23.7	0.15	1.5
Burns	50	−19	16.4	T.	T.
Carbon	48	−12	27.2	T.	T.
Centennial	49	−15	24.7	0.75	7.5
Cody	70	−11	33.0	0.45	4.5
Embar	55	−10	29.4	0.10	1.0
Evanston	45	0	24.4	0.30	3.0
Fort Laramie	65	−5	33.2	0.00	
Fort Washakie	57	−11	28.7	0.01	0.1
Fort Yellowstone	37	−12	22.1	0.92	9.2
Fourbear	62	−14	28.6	0.23	4.0
Hyattville	55	−12	27.0	0.20	2.0
Iron Mountain	55	−15	30.3	0.02	0.2
Kimball Ranch	54	−11	32.0	0.83	8.8
Laramie	50	−7	25.5	0.01	0.8
Lovell	48	−14	19.8	0.07	0.5
Lusk	57	−15	27.6	0.00	
Rawlins	44	−9	25.0	0.13	1.3
Sheridan	53	−14	25.0	0.10	1.0
Sherman	.....	.....	.....	0.30	3.0
Thayne	42	−10	21.6	0.91	6.4
Thermopolis	55	−10	27.2	0.11	1.1
Wamsutter	52	12	32.0	0.00	
Puerto Rico.					
Adjuntas	82	52	67.4	2.58	
Aguadilla	91[e]	71[e]	78.6[e]	2.96	
Arecibo	85	63	73.4		
Bayamon	93	60	75.8	5.51	
Caguas [a]	89	59	74.2	1.59	
Canovanas	84	66	74.8	5.54	
Cayey	81	56	69.3	4.28	
Comerio	87	48	66.8		
Corozal	88	58	72.8	4.59	
Fajardo	85	63	76.8	4.44	
Hacienda Coloso	89	61	74.6	1.41	
Humacao	86	63	75.8	4.30	
Isabela	83	66	74.8	1.87	
La Isolina	85	63	72.3	3.45	
Lajas	90	59	75.3	4.25	
Luquillo	85	63	73.8	9.69	
Manati	90	58	74.2	4.31	
Maunabo	87	68	76.5	5.97	
Mayaguez	91	63	76.6	1.49	
Morovis	89	60	73.6	3.10	
Ponce [e]	82	61	73.2	0.52	
Port America	88	51	76.0	2.28	
Puerta de Tierra	88	68	76.7	4.06	
San German	91	59	72.4	3.62	
San Lorenzo	89	57	73.9	3.72	
Utuado [e]	91	61	75.8		
Vieques	89	68	76.9	6.15	
Yanco	88	63	77.2	6.05	
Mexico.					
Ciudad P. Diaz	74	34	55.6	1.80	
Coatzacoalcos [2]	.....	.....	72.9	.....	
Leon de Aldamas	76	32	56.5	0.06	
Puebla	70	42	58.6	T.	
Tampico [2]	.....	.....	66.9		
Topolobampo *[1]	84	45	64.4	T.	
Vera Cruz [2]	.....	.....	70.6		
New Brunswick.					
St. John	47	−6	22.6	7.15	21.3
Nicaragua.					
Manhattan Plantation†	94	62	78.3	0.56	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Late reports for December, 1899.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alaska.	°	°	°	*Ins.*	*Ins.*
Fort Yukon	15	−68	−24.8	0.61	6.1
Sitka	50	21	36.8	6.94	T.
Arkansas.					
Fayetteville	65[e]	11[e]	37.8[e]	2.15	0.2
Hot Springs *b*	......	......	......	5.20	......
Russellville	65	24	43.2	4.94	3.2
California.					
San Miguel Island	77	38	55.9	0.65	
Iowa.					
Toledo	49	− 8	23.2	1.70	
Louisiana.					
Robeline	......	......	......	4.90	
Montana.					
Billings	60	−11	25.6	......	
Redlodge [s]	71	−20	26.9	0.70	7.0
Nebraska.					
Gordon	......	......	......	0.40	......
Hickman	......	......	......	1.55	5.0
New Mexico.					
Los Lunas	64	10	39.6	0.00	
Oregon.					
Bialock	59	21	39.2	1.42	T.
Lakeview	50	2	27.0	2.43	10.5
Tillamook Rock	......	......	......	6.65	
Texas.					
Jasper	90	30	56.9	......	
Mexico.					
Topolobampo *[1]	84	46	63.1	2.63	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Cuba.	°	°	°	*Ins.*	*Ins.*
Aguacate	86	48	68.2	0.57	
Anstralia	86	49	68.9	T.	
Banaguises	87	55	70.1	T.	
Batabano	89	50	71.0	0.00	
Camajuani	82	46	67.2	1.27	
Cardenas	87	53	72.0	0.84	
Cienfuegos	......	......	......	0.23	
Gibara	84	55	71.7	1.30	
Holguin	88	56	71.5	2.02	
Manzanillo	82	61	73.2	2.94	
Matanzas	84	50	68.8	0.74	
Pinar del Rio	87	51	71.2	0.55	
Sagua la Grande	85	49	69.8	0.90	
Santa Clara	86	51	68.8	.0.04	
Soledad	84	46	68.8	0.35	
Union de Reyes	85	57	73.1	0.00	
Nicaragua.					
Manhattan Plantation†	96	68	79.3	5.01	

†On Pearl Lagoon, 40 miles north of Bluefields. Hours at which temperature observations were made, 6 a. m., 12 m., and 6 p. m.

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTION.

Table V, December, 1899, page 568, 5th line from bottom, Minneapolis should read Moorhead.

The following changes have been made in the names of stations:

California, Arlington Heights changed to Riverside; Centerville changed to Niles; Malakoff Mine changed to North Bloomfield.
Georgia, Crescent changed to Valona.
Missouri, Stellada changed to Windsor.
New Mexico, Gila changed to Lyons Ranch.
North Dakota, Washburn changed to Falconer.
Pennsylvania, Salem Corners changed to Hamlinton.
Virginia, Richmond (near) changed to Bonair.

TABLE III.—*Mean temperature for each hour of seventy-fifth meridian time, January, 1900.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	16.0	15.4	14.6	13.7	13.3	13.0	13.1	13.4	11.9	11.4	13.4	16.4	19.2	21.6	24.3	25.6	25.9	25.0	22.7	21.0	19.7	18.9	18.2	17.3	17.7
Boston, Mass	28.7	28.6	27.9	27.6	27.2	27.1	27.3	27.9	28.6	29.9	31.6	33.0	33.9	34.5	34.5	34.5	33.9	32.9	32.0	31.2	30.6	30.3	29.7	29.1	30.5
Buffalo, N. Y.........	27.5	27.5	27.0	26.8	26.6	26.5	26.5	26.1	26.0	26.4	27.3	28.3	28.7	29.5	29.9	29.9	29.5	28.9	28.4	28.2	27.9	27.7	27.8	27.5	27.8
Cedar City, Utah....	33.8	33.0	32.7	32.4	32.4	31.7	31.3	31.4	30.7	30.1	32.1	34.8	37.7	40.4	42.2	43.7	44.6	44.7	43.2	39.7	37.1	36.0	35.0	34.1	35.0
Chicago, Ill...........	27.4	26.9	26.3	25.4	24.9	24.7	24.6	25.1	25.2	25.8	27.2	28.4	29.4	30.4	30.9	30.9	31.1	30.9	30.3	29.7	28.9	28.5	28.2	27.5	27.9
Cincinnati, Ohio....	34.1	33.9	33.3	33.5	33.0	32.6	31.9	32.5	31.8	32.2	33.6	35.6	36.9	37.9	39.1	40.0	39.8	39.0	37.6	36.4	35.8	35.1	34.5	34.2	35.2
Cleveland, Ohio	29.4	28.6	28.1	28.0	27.6	27.7	27.6	28.0	27.8	28.4	29.4	30.2	30.6	31.2	31.4	31.6	31.7	31.2	30.4	30.2	29.8	29.6	29.5	29.4	29.5
Detroit, Mich........	27.5	27.3	27.1	26.7	26.7	26.5	26.2	26.4	26.2	26.7	27.5	28.3	29.0	29.8	30.5	30.4	30.3	29.6	29.2	28.8	28.4	28.2	27.9	27.5	28.0
Dodge, Kans..........	32.0	31.0	29.7	28.9	28.4	27.8	27.3	26.6	25.7	27.5	32.7	38.2	42.7	45.2	47.4	48.8	49.3	48.4	44.3	39.4	36.1	34.8	33.7	33.0	35.8
Eastport, Me..........	21.5	21.7	21.5	21.5	21.2	21.8	22 0	22.1	23.3	24.0	25.0	25.8	26.5	26.8	26.9	26.7	26.2	25.6	25.1	25.1	24.3	23.9	23.5	22.8	24.0
Galveston, Tex.......	53.2	53.0	52.8	52.7	52.5	52.2	52.1	52.2	51.9	52.6	53.4	54.1	54.6	55.4	56.0	56.4	56.5	56.4	55.8	55.5	54.9	54.4	53.9	53.7	54.0
Havre, Mont...........	24.5	24.2	24.5	23.8	23.0	22.7	22.4	22.3	21.7	21.9	22.4	25.5	29.0	31.2	32.8	34.1	34.4	33.6	31.7	30.4	29.1	27.9	26.9	25.9	26.9
Independence, Cal..	44.1	43.8	43.4	42.9	41.8	41.6	40.3	40.3	38.7	38.2	38.8	41.0	44.8	47.7	51.5	54.0	56.2	56.7	55.6	53.1	49.2	47.2	46.8	45.7	46.0
Kalispell, Mont	29.8	29.2	28.4	28.2	27.4	27.7	27.2	27.4	26.8	26.6	26.5	27.5	28.8	30.5	32.3	33.4	34.9	35.0	34.1	32.4	31.2	30.7	30.4	29.9	29.8
Kansas City, Mo.....	32.6	32.1	31.2	30.5	29.9	29.6	29.3	29.1	28.9	29.8	32.1	35.0	36.8	38.3	40.0	41.2	41.5	40.8	39.5	37.8	36.8	35.6	34.5	33.6	34.4
Key West, Fla........	65.5	65.5	65.0	64.9	64.8	64.6	64.7	65.2	65.7	66.1	67.1	67.4	67.9	68.1	68.5	68.0	67.2	66.3	66.2	66.3	65.8	65.5	65.5	65.3	66.1
Marquette, Mich	21.7	21.4	21.2	21.3	21.4	21.5	21.4	21.7	21.4	21.8	22.5	23.5	24.4	25.0	25.5	25.3	25.0	24.7	24.3	23.8	23.4	23.1	22.7	22.5	22.9
Memphis, Tenn.......	42.7	42.2	41.6	41.2	40.6	40.3	39.8	39.4	39.7	41.2	43.2	44.9	46.8	48.3	49.3	49.9	49.5	48.5	47.6	46.9	45.5	44.6	43.7	43.1	44.2
Mt. Tamalpais, Cal..	47.6	47.9	47.5	47.3	46.9	46.8	46.4	46.6	46.2	45.7	46.1	46.9	47.7	48.0	49.0	49.0	49.3	49.6	48.9	48.4	47.7	47.6	47.9	47.6	47.6
New Orleans, La.....	49.7	49.0	48.6	48.3	47.9	47.6	47.2	47.0	47.5	48.8	51.4	53.4	55.0	56.2	56.6	57.1	57.2	56.4	55.0	53.8	52.8	52.1	51.7	50.8	52.1
New York, N. Y.....	31.6	31.2	31.2	30.8	30.4	30.2	30.4	30.4	30.5	31.5	33.0	34.4	35.3	36.0	36.6	36.7	36.4	35.5	34.7	34.4	33.5	32.9	32.4	32.0	33.0
Philadelphia, Pa.....	32.7	32.2	31.9	31.8	31.4	31.2	30.7	31.2	31.8	33.4	35.3	36.8	38.2	39.1	39.4	39.1	37.9	36.8	36.0	35.8	34.6	34.4	33.9	33.1	34.5
Pittsburg, Pa.........	32.1	31.6	31.6	31.5	31.2	31.2	31.1	31.5	31.6	32.8	33.9	34.5	35.3	36.5	37.6	37.6	36.3	35.2	34.1	33.6	32.6	32.5	32.1	31.9	33.3
Portland, Oreg......	44.0	43.8	42.8	42.5	42.1	42.0	41.7	41.8	41.1	40.4	40.3	40.6	41.5	42.5	44.3	45.2	46.3	46.8	47.3	46.9	46.0	45.5	45.1	44.6	43.6
St. Louis, Mo.........	35.9	35.2	34.6	33.8	33.3	32.6	32.0	31.8	31.8	32.6	33.9	35.7	37.5	39.4	40.8	41.5	41.7	41.0	40.1	39.3	38.4	37.6	37.1	36.3	36.4
St. Paul, Minn.......	20.0	19.3	18.5	17.7	17.4	17.0	17.1	17.3	17.4	17.6	18.7	20.7	23.1	24.8	26.0	26.7	27.1	26.3	24.7	23.5	22.5	21.7	21.1	20.4	21.1
Salt Lake City, Utah.	32.7	32.3	32.3	32.1	31.5	31.0	31.1	32.0	30.6	31.0	31.6	34.0	36.6	38.5	39.3	40.5	41.3	41.1	39.5	37.7	36.6	35.7	34.6	33.8	34.9
San Diego, Cal.......	56.0	55.3	54.5	54.3	53.9	53.8	53.3	53.1	53.1	52.6	53.2	55.8	58.8	60.6	62.3	62.4	62.5	62.3	61.5	60.3	59.4	58.5	57.3	56.5	57.1
San Francisco, Cal...	50.1	49.8	49.2	49.0	48.5	48.2	48.2	48.8	48.2	47.6	47.5	48.0	49.1	50.3	51.6	52.8	53.4	53.9	53.6	52.9	52.5	51.9	51.8	50.5	50.3
Santa Fe, N. Mex ...	32.1	31.5	30.5	30.2	29.8	29.3	28.3	28.1	27.0	28.7	32.9	35.8	38.4	40.2	42.1	43.5	44.3	44.0	41.6	38.4	35.6	34.3	33.3	32.9	34.7
Savannah, Ga.........	46.2	45.6	45.2	44.7	44.3	43.7	43.7	43.7	44.9	47.8	50.9	53.7	55.5	56.8	57.3	57.2	56.1	53.5	51.5	50.5	49.0	48.1	47.3	46.7	49.3
Washington, D. C....	33.6	32.8	31.9	31.2	30.2	29.6	29.5	29.8	31.1	33.5	35.7	37.4	39.0	40.6	41.5	41.6	40.8	39.5	38.0	36.6	35.5	35.1	34.0	33.6	35.1
West Indies.																									
Basseterre, St. Kitts.	74.7	74.4	74.5	74.4	74.3	74.3	76.5	77.9	79.0	80.2	80.8	80.7	80.3	79.8	79.4	78.4	76.8	76.3	76.1	76.1	76.1	75.6	75.1	74.6	76.9
Bridgetown, Bar.....	74.8	74.5	74.4	74.2	73.7	74.3	77.9	80.1	81.6	82.5	83.1	83.4	83.0	82.4	81.5	80.4	78.5	76.9	76.4	75.9	75.7	75.3	75.1	75.0	77.9
Cienfuegos, Cuba ...	64.7	63.9	63.7	63.2	62.8	62.5	62.2	64.4	68.4	72.0	74.5	76.0	76.9	77.2	77.5	76.8	75.1	72.9	70.8	67.4	67.9	67.1	65.8	65.5	69.2
Havana, Cuba........	67.0	66.4	66.2	66.1	65.8	65.9	65.7	66.2	68.2	71.1	72.4	73.0	73.6	73.3	73.2	72.9	72.2	71.5	70.6	70.0	69.2	68.9	68.3	67.6	69.4
Port of Spain, Trin..	73.3	73.0	72.6	72.4	72.6	73.2	76.3	80.5	81.5	83.0	84.2	84.1	83.6	83.6	82.7	81.7	80.0	78.2	77.6	77.0	76.1	75.4	74.5	73.7	77.9
P. Principe, Cuba ...	65.2	64.5	63.9	63.5	63.2	63.2	63.0	65.5	69.1	72.5	74.6	76.5	77.2	77.5	76.7	75.4	74.0	71.8	69.9	68.9	67.7	67.0	66.3	65.8	69.3
Roseau, Dominica ..	74.0	73.9	73.6	73.4	73.2	73.1	75.0	78.4	79.7	81.1	81.8	82.3	82.6	82.4	81.3	80.5	78.5	76.3	75.9	75.5	75.2	74.7	74.5	73.9	77.1
San Juan, P. R........	72.6	72.5	72.2	72.0	71.8	72.0	73.1	74.7	77.7	79.1	79.8	80.1	79.9	79.5	78.7	78.0	76.6	76.0	75.7	75.0	74.7	74.1	73.5	73.0	75.5
Santiago de Cuba...	70.1	69.5	69.1	68.8	68.4	68.2	69.1	71.0	75.2	77.4	80.2	81.0	81.4	81.1	80.9	80.0	78.4	76.2	74.8	73.8	73.0	72.3	71.6	71.0	74.8
Santo Domingo, S. D.	69.3	68.6	68.2	67.7	67.6	67.0	67.7	70.9	75.1	77.9	79.1	80.1	80.4	79.9	79.5	78.4	77.4	76.0	74.9	73.7	72.4	71.8	70.5	69.7	73.5
Willemstad, Curaçao	76.7	76.7	76.5	76.2	76.2	76.3	77.5	79.1	80.3	81.5	82.1	82.4	82.5	82.5	81.7	80.6	79.6	78.4	77.8	77.8	77.4	77.4	77.1	76.7	78.8

TABLE IV.—*Mean pressure for each hour of seventy-fifth meridian time, January, 1900.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midn't.	Mean.
Bismarck, N. Dak....	28.256	.254	.255	.259	.259	.255	.251	.255	.259	.265	.270	.274	.261	.247	.238	.236	.241	246	.250	.252	.257	.260	.259	.258	.255
Boston, Mass.........	29.865	.870	.869	.865	.863	.862	.872	.878	.884	.885	.869	.844	.826	.823	.831	.841	.847	.858	.867	.869	.870	.870	.865	.857	.860
Buffalo, N. Y.........	29.145	.148	.157	.155	.156	.157	.166	.172	.182	.186	.181	.160	.135	.127	.131	.136	.141	.150	.158	.159	.156	.153	.151	.151	.155
Cedar City, Utah....	24.333	.334	.330	.325	.329	.329	.326	.322	.325	.334	.350	.366	.370	.359	.333	.313	.307	.306	.308	.312	.316	.325	.328	.333	.330
Chicago, Ill...........	29.142	.138	.142	.144	.142	.140	.148	.155	.162	.171	.176	.163	.142	.123	.121	.128	.135	.141	.151	.156	.158	.161	.161	.159	.148
Cincinnati, Ohio	29.405	.402	.403	.402	.398	.400	.406	.413	.426	.436	.436	.420	.395	.381	.381	.387	.396	.402	.410	.416	.422	.427	.426	.422	.409
Cleveland, Ohio	29.189	.195	.197	.195	.195	.194	.200	.206	.215	.219	.215	.198	.180	.171	.175	.181	.188	.196	.196	.204	.205	.205	.200	.198	.197
Detroit, Mich.........	29.216	.214	.221	.221	.215	.212	.215	.222	.229	.239	.241	.227	.208	.196	.196	.202	.207	.212	.218	.224	.229	.229	.229	.228	.219
Dodge, Kans	27.470	.466	.466	.470	.471	.468	.467	.465	.478	.485	.497	.495	.477	.451	.429	.419	.419	.422	.427	.441	.450	.460	.468	.472	.460
Eastport, Me	29.870	.871	.872	.872	.870	.871	.875	.883	.891	.896	.875	.855	.837	.830	.829	.827	.832	.835	.842	.850	.855	.857	.854	.850	.858
Galveston, Tex.......	30.059	.056	.055	.054	.053	.053	.056	.062	.078	.092	.104	.103	.078	.053	.039	.032	.025	.025	.030	.038	.050	.063	.073	.074	.058
Havre, Mont..........	27.333	.330	.328	.332	340	.342	.339	.341	.344	.347	.352	.357	.356	.342	.322	.314	.316	.317	.317	.318	.315	.317	.316	.316	.331
Independence, Cal ..	26.088	.091	.093	.091	.093	.092	.089	.087	.095	.102	.111	.129	.135	.126	.094	.069	.057	.050	.047	.046	.054	.062	.074	.085	.086
Kalispell, Mont	26.965	.967	.967	.970	.978	.983	.986	.985	.990	.993	.002	.008	.011	.001	.985	.970	.964	.964	.964	.964	.962	.965	.965	.967	.978
Kansas City, Mo.....	29.090	.087	.090	.092	.088	.087	.084	.090	.096	.108	.117	.119	.098	.073	.060	.057	.063	.067	.073	.080	.084	.091	.099	.102	.087
Key West, Fla........	30.056	.053	.046	.042	.039	.045	.055	.064	.091	.107	.096	.076	.049	.033	.023	.025	.029	.032	.041	.054	.065	.071	.073	.071	.056
Marquette, Mich ...	29.102	.111	.120	.124	.121	.118	.122	.128	.128	.137	.140	.137	.119	.106	.101	.108	.112	.112	.115	.118	.113	.113	.115	.116	.118
Memphis, Tenn......	29.704	.702	.705	.708	.707	.707	.710	.725	.744	.756	.765	.757	.725	.705	.692	.690	.691	.694	.699	.704	.709	.715	.721	.722	.715
Mt. Tamalpais, Cal .	27.631	.632	.628	.622	.622	.621	.616	.609	.614	.621	.635	.650	.657	.658	.639	.621	.614	.614	.617	.623	.626	.632	.636	.642	.628
New Orleans, La.....	30.079	.077	.076	.077	.076	.079	.086	.096	.112	.123	.129	.123	.094	.070	.059	.053	.053	.055	.060	.065	.075	.082	.086	.089	.082
New York, N. Y.....	29.699	.701	.705	.703	.701	.703	.713	.722	.732	.735	.721	.697	.675	.670	.675	.679	.686	.695	.704	.713	.717	.715	.707	.700	.703
Philadelphia, Pa.....	29.946	.953	.956	.954	.955	.958	.967	.978	.989	.995	.986	.960	.935	.930	.930	.933	.937	.945	.954	.958	.955	.957	.955	.950	.956
Pittsburg, Pa.........	29.135	.136	.140	.139	.133	.133	.141	.149	.161	.165	.157	.137	.115	.104	.105	.114	.125	.133	.139	.146	.147	.148	.147	.145	.137
Portland, Oreg......	29.937	.945	.949	.948	.951	.958	.952	.949	.945	.948	.952	.962	.971	.971	.956	.939	.927	.926	.924	.926	.926	.933	.941	.947	.945
St. Louis, Mo.........	29.473	.469	.476	.481	.478	.477	.487	.490	.507	.518	.527	.520	.494	.471	.459	.460	.461	.464	.470	.477	.483	.485	.487	.487	.484
St. Paul, Minn........	29.113	.114	.116	.125	.122	.117	.112	.113	.116	.120	.131	.135	.122	.103	.087	.085	.091	.096	.103	.112	.119	.119	.119	.122	.113
Salt Lake City, Utah.	25.756	.757	.755	.755	.761	.763	.759	.758	.763	.769	.776	.786	.791	.781	.756	.741	.736	.735	.738	.738	.743	.745	.747	.753	.757
San Diego, Cal.......	29.981	.981	.974	.971	.971	.970	.964	.963	.957	.976	.991	.005	.013	.002	.975	.951	.942	.942	.943	.944	.955	.962	.969	.978	.970
San Francisco, Cal...	29.985	.987	.983	.978	.980	.982	.975	.969	.971	.978	.990	.006	.020	.021	.999	.981	.975	.968	.970	.968	.974	.981	.986	.992	.984
Santa Fe, N. Mex ...	23.277	.275	.267	.269	.270	.266	.260	.259	.269	.278	.289	.298	.291	.270	.246	.237	.236	.329	.244	.251	.258	.265	.270	.276	.265
Savannah, Ga........	30.050	.051	.048	.046	.045	.051	.060	.074	.090	.100	.096	.079	.053	.038	.030	.028	.032	.039	.047	.053	.059	.065	.066	.063	.057
Washington, D. C....	29.971	.977	.982	.980	.980	.981	.990	.004	.017	.022	.004	.978	.965	.952	.948	.950	.956	.964	.970	.975	.982	.983	.982	.978	.979
West Indies.																									
Basseterre, St. Kitts.	29.939	.926	.919	.918	.928	.944	.970	.988	.995	.986	.966	.941	.925	.915	.915	.919	.928	.938	.954	.965	.969	.967	.961	.953	.947
Bridgetown, Bar....	29.876	.869	.871	.876	.886	.901	.930	.932	.933	.922	.904	.882	.864	.857	.858	.862	.871	.882	.895	.906	.910	.907	.900	.892	.891
Cienfuegos, Cuba...	29.966	.958	.948	.944	.946	.952	.967	.986	.001	.006	.999	.979	.948	.930	.919	.917	.925	.935	.949	.969	.979	.985	.984	.978	961
Havana, Cuba........	29.998	.987	.977	.975	.973	.977	.989	.005	.022	.034	.032	.016	.992	.972	.959	.956	.961	.968	.977	.991	.002	.012	.013	.006	.991
Kingston, Jamaica..	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Port of Spain, Trin..	29.830	.820	.815	.819	.828	.845	.872	.888	.891	.879	.860	.836	.812	.795	.791	.797	.808	.819	.837	.853	.858	.858	.854	.845	.838
P. Principe, Cuba ...	29.643	.634	.624	.622	.625	.634	.647	.663	.680	.686	.677	.654	.628	.609	.602	.605	.612	.623	.635	.649	.657	.662	.659	.652	.641
Roseau, Dominica ..	29.903	.895	.893	.894	.901	.916	.933	.953	.958	.950	.931	.908	.890	.881	.878	.881	.888	.899	.912	.926	.928	.927	.923	.916	.912
San Juan, P. R......	29.909	.896	.886	.888	.894	.906	.924	.942	.951	.943	.928	.903	.884	.873	.871	.877	.884	.897	.910	.925	.930	.930	.926	.919	.906
Santiago de Cuba...	29.881	.871	.862	.864	.869	.879	.899	.910	.929	.930	.908	.883	.854	.841	.836	.839	.846	.854	.870	.887	.902	.905	.901	.895	.880
Santo Domingo, S. D.	29.949	.935	.926	.919	.928	.941	.962	.981	.998	.995	.976	.949	.924	.906	.900	.901	.912	.924	.938	.957	.966	.970	.965	.956	.945
Willemstad, Curaçao	29.809	.795	.786	.792	.801	.815	.842	.861	.868	.861	.841	.816	.783	.766	.757	.761	.770	.783	.804	.821	.833	.834	.830	.825	.811

TABLE V.—*Average wind movement for each hour of seventy-fifth meridian time, January, 1900.*

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
Abilene, Tex	7.3	7.8	7.9	7.5	7.5	7.5	7.5	8.6	8.9	8.0	8.8	10.0	10.5	10.7	10.8	10.8	10.6	10.5	9.4	7.8	7.0	6.8	6.5	6.8	8.6
Albany, N. Y	7.4	8.0	7.9	8.4	9.4	9.4	9.4	10.4	9.7	10.2	10.4	10.4	11.0	11.3	10.5	10.1	9.4	9.0	8.5	8.2	7.7	7.4	7.5	7.1	9.1
Alpena, Mich	11.3	10.6	10.4	10.1	10.4	10.8	9.9	10.3	10.5	11.2	12.1	12.8	13.4	13.9	13.5	13.2	12.4	11.9	12.0	11.3	11.0	11.2	10.8	11.1	11.5
Amarillo, Tex	8.5	8.3	8.5	8.4	9.0	9.1	8.7	9.2	8.6	9.3	10.9	11.2	12.5	12.1	11.8	11.3	11.2	10.6	8.0	7.2	7.0	7.4	7.9	8.2	9.4
Atlanta, Ga	12.2	12.9	13.3	13.0	12.5	12.4	12.6	12.4	11.8	11.5	11.4	11.5	11.1	10.8	11.3	11.2	11.7	10.9	10.9	11.4	11.3	11.9	12.1	12.0	11.8
Atlantic City, N. J	10.6	11.8	11.9	11.1	11.0	10.9	11.1	11.2	11.5	13.2	14.2	13.7	14.2	14.2	14.0	13.1	12.1	11.2	11.3	11.8	12.3	11.6	11.7	11.4	12.1
Augusta, Ga	4.3	4.2	4.6	4.5	4.7	4.9	5.1	5.8	5.8	6.8	7.3	7.1	7.7	8.5	8.5	8.0	7.5	7.1	6.3	5.6	5.5	5.7	5.8	5.4	6.1
Baker City, Oreg	5.9	7.2	6.7	6.2	6.4	6.2	6.1	7.0	6.5	6.5	6.1	5.9	4.5	4.9	4.7	5.5	5.6	5.4	4.8	4.1	4.2	5.2	5.8	5.7	5.7
Baltimore, Md	4.7	4.8	4.7	4.2	3.8	4.0	4.1	4.3	5.0	5.6	6.1	6.1	6.7	6.8	6.7	6.1	5.7	5.1	5.1	5.1	5.3	5.6	5.4	5.6	5.3
Bismarck, N. Dak	8.0	7.1	7.4	7.1	7.7	7.7	8.2	8.5	8.4	9.4	9.0	9.9	11.7	11.4	11.7	11.8	11.8	10.1	9.2	8.5	7.8	8.0	7.7	7.5	9.0
Block Island, R. I	19.6	19.5	19.8	19.8	19.5	19.6	20.5	20.4	20.0	20.7	20.3	20.5	21.3	20.4	20.8	20.5	20.7	21.0	22.0	22.1	21.4	21.3	21.2	20.8	20.6
Boise, Idaho	3.5	3.6	3.2	2.9	3.1	3.2	3.3	2.9	2.8	2.7	2.8	3.1	4.0	4.5	4.9	5.3	5.8	5.4	5.2	4.6	3.8	3.3	3.1	2.9	3.8
Boston, Mass	11.5	11.8	11.3	11.0	11.0	10.8	11.7	12.0	12.3	12.5	12.3	13.5	13.3	13.7	13.7	13.3	13.1	12.6	13.4	13.1	13.5	12.9	13.0	13.1	12.5
Buffalo, N. Y	17.3	17.5	17.2	17.9	17.4	17.5	17.6	16.4	15.7	16.1	16.3	16.1	18.0	17.3	17.2	17.0	17.5	16.6	16.7	16.7	15.6	16.3	17.1	17.7	16.9
Cairo, Ill	8.2	8.4	8.2	8.4	8.0	7.9	8.1	7.6	7.7	8.4	8.5	9.1	9.5	10.5	10.6	10.9	10.5	9.9	8.3	8.3	8.2	8.1	8.5	8.6	8.8
Cape Henry, Va	11.6	11.6	11.6	11.7	12.0	11.6	11.1	11.6	11.8	12.0	12.8	12.8	13.2	13.1	12.2	11.5	11.7	11.2	12.1	12.5	12.8	12.7	13.3	12.9	12.1
Carson City, Nev	3.4	3.8	3.8	3.5	3.6	3.4	3.7	3.3	3.5	3.5	3.6	2.9	3.5	4.1	4.2	4.9	6.1	7.1	7.8	7.3	4.9	4.7	3.8	3.3	4.3
Cedar City, Utah	5.3	5.4	5.3	5.3	5.2	4.7	5.0	5.2	4.7	4.7	3.8	3.2	2.8	3.4	4.1	4.5	5.0	5.1	4.5	4.6	5.4	5.6	6.4	5.6	4.8
Charleston, S. C	8.1	8.0	8.0	8.6	9.0	9.2	9.5	9.7	9.7	9.6	10.4	11.4	12.2	11.3	11.3	11.6	11.4	10.2	9.0	8.7	8.7	8.6	8.4	9.0	9.6
Charlotte, N. C	6.2	6.0	6.5	6.3	6.0	5.9	5.7	5.9	6.1	6.9	7.3	8.0	8.3	8.8	8.5	8.2	7.7	6.8	6.7	6.7	6.3	6.2	6.4	6.1	6.8
Chattanooga, Tenn	5.5	5.6	5.8	6.0	5.7	5.4	5.3	5.6	5.9	5.7	5.9	6.3	6.5	7.5	8.5	9.4	9.4	8.6	8.6	7.3	6.7	6.2	6.4	6.5	6.7
Cheyenne, Wyo	9.2	9.5	10.0	10.6	10.4	10.2	11.6	11.9	12.2	10.4	11.4	13.7	17.5	18.5	19.6	19.3	18.0	16.1	13.3	10.8	10.0	8.9	8.7	9.4	12.6
Chicago, Ill	16.9	17.1	16.8	17.3	17.1	16.8	17.0	17.1	16.9	17.4	17.5	17.9	20.1	19.8	19.8	20.0	19.3	18.8	18.6	18.4	18.1	18.0	17.1	16.8	17.9
Cincinnati, Ohio	7.6	7.2	7.0	7.2	6.9	7.3	7.5	8.1	9.0	9.1	9.5	9.5	9.6	10.7	10.5	10.9	10.6	9.0	8.7	8.0	8.3	7.7	7.9	7.7	8.6
Cleveland, Ohio	18.4	17.6	16.8	16.4	16.2	16.0	15.6	15.0	15.0	16.1	17.2	17.2	17.5	17.3	17.5	17.9	18.6	18.8	18.9	19.7	19.8	19.7	19.5	19.2	17.6
Columbia, Mo	9.3	9.1	9.1	8.9	8.4	8.5	8.3	8.6	8.3	8.5	9.7	10.2	10.7	10.8	10.8	11.1	10.3	9.3	8.3	8.5	9.0	9.0	9.4	8.8	9.3
Columbus, Ohio	8.6	8.0	7.6	7.6	7.9	7.7	7.4	7.5	7.5	8.7	9.3	9.6	10.2	10.2	9.8	10.2	10.1	9.4	9.3	9.0	9.6	8.8	8.6	8.5	8.8
Concordia, Kans	6.8	5.8	5.8	5.2	5.0	5.1	5.2	4.7	4.4	5.4	6.8	6.9	7.5	7.8	7.9	7.9	7.8	6.9	4.9	5.0	5.3	5.4	5.7	6.4	6.0
Corpus Christi, Tex	10.4	9.4	9.3	8.8	8.6	8.3	8.4	8.5	8.3	8.8	9.5	9.5	10.5	11.0	11.5	12.2	12.1	11.8	11.4	10.1	9.9	10.1	10.9	10.4	10.0
Davenport, Iowa	8.2	8.1	8.1	8.0	7.5	7.5	7.9	8.0	7.8	8.0	8.6	8.8	10.1	10.3	10.1	10.0	9.5	9.0	8.5	7.8	7.4	7.8	7.8	7.9	8.4
Denver, Colo	8.3	8.2	8.1	8.5	7.8	7.5	6.8	7.4	8.4	9.0	9.3	8.6	8.3	8.1	8.5	8.8	9.2	8.5	7.9	8.7	8.3	8.6	8.1	7.2	8.3
Des Moines, Iowa	7.7	7.1	7.1	6.8	7.0	7.0	6.6	7.3	7.3	8.0	8.7	9.4	9.5	9.8	10.0	9.8	9.6	9.3	7.5	7.9	8.8	8.5	8.7	7.7	8.2
Detroit, Mich	11.1	10.8	10.4	10.4	10.4	10.4	10.7	10.4	10.5	11.2	12.1	12.6	13.1	12.9	13.3	12.4	12.7	12.3	12.8	12.7	12.8	12.1	11.5	11.2	11.7
Dodge, Kans	6.5	6.7	6.5	6.8	7.1	7.0	7.3	7.4	7.5	7.8	9.3	10.8	11.5	12.4	12.3	12.0	11.6	10.5	7.4	5.5	5.5	5.5	6.3	6.6	8.2
Dubuque, Iowa	8.9	8.1	7.9	7.8	8.2	7.6	7.5	7.5	7.4	8.5	8.7	9.5	9.5	9.6	10.1	10.4	9.9	8.8	8.0	8.0	8.8	9.3	8.9	9.1	8.7
Duluth, Minn	9.7	10.5	10.3	11.0	10.2	9.4	9.7	9.1	9.1	9.5	8.9	8.7	8.9	9.5	9.7	10.1	10.1	9.5	9.6	10.0	10.2	10.8	9.8	8.9	9.7
Eastport, Me	12.8	13.1	13.9	14.1	14.7	14.7	15.8	15.7	15.0	15.9	16.5	17.1	16.6	15.4	15.8	13.8	13.1	13.2	14.3	13.6	14.4	14.1	14.2	14.0	14.7
Elkins, W. Va	4.4	4.4	4.5	4.5	4.2	4.1	3.8	4.4	4.9	5.2	6.2	6.7	7.2	8.3	8.7	8.5	7.9	6.7	6.2	5.5	5.3	5.4	5.1	4.8	5.7
El Paso, Tex	8.3	8.4	8.1	9.1	9.0	9.5	9.5	9.1	8.3	8.1	8.4	8.8	9.5	9.2	9.4	10.3	11.0	11.3	11.4	8.5	7.8	8.5	9.3	8.4	9.1
Erie, Pa	15.3	14.9	14.5	14.1	13.8	13.7	12.9	12.8	12.7	12.6	12.4	12.9	14.4	13.6	13.5	13.3	12.9	13.0	13.9	14.8	15.8	16.0	16.2	16.1	14.0
Escanaba, Mich	8.7	9.4	9.5	9.4	9.3	9.6	9.4	9.2	9.8	10.4	10.8	11.2	12.4	12.5	12.0	11.2	11.3	10.3	9.8	9.3	9.5	9.8	9.0	9.1	10.1
Eureka, Cal	3.8	3.7	4.5	3.5	3.2	3.4	3.2	3.0	3.5	3.5	3.3	3.5	3.7	3.3	3.7	4.6	6.0	6.2	6.4	6.6	5.4	4.4	3.5	3.3	4.1
Evansville, Ind	7.3	7.0	6.7	6.8	6.8	6.7	6.4	6.5	6.6	7.5	8.4	8.5	9.2	9.5	10.1	9.8	9.4	8.2	7.5	7.3	7.5	7.1	7.0	7.2	7.7
Fort Smith, Ark	6.2	6.1	6.2	6.6	7.2	6.8	7.5	6.8	6.9	7.0	7.0	7.2	8.1	7.8	8.2	8.4	8.7	8.4	8.7	5.9	6.0	6.6	6.4	5.9	7.1
Fresno, Cal	3.5	3.6	3.7	3.8	3.7	3.5	3.5	3.2	3.5	3.1	3.5	3.4	4.3	4.0	3.7	3.5	3.6	3.6	4.0	3.1	2.8	3.4	3.4	3.2	3.5
Galveston, Tex	9.9	9.5	9.6	9.6	9.5	9.5	8.8	8.7	8.1	8.7	9.9	9.9	9.6	9.4	9.4	9.3	9.2	9.2	8.9	9.7	10.0	10.1	10.3	10.3	9.5
Grand Haven, Mich	11.7	11.3	10.9	10.8	10.9	11.1	11.0	11.1	11.6	11.6	12.2	12.5	12.4	12.5	12.7	12.1	12.2	12.0	11.8	11.9	11.9	12.0	12.2	12.5	11.8
Grand Junction, Colo	3.0	3.1	3.0	3.5	3.6	3.6	3.7	3.6	3.7	4.0	4.3	5.0	5.4	5.0	4.5	3.9	3.6	3.6	3.1	2.3	2.2	2.4	2.8	3.1	3.6
Green Bay, Wis	8.3	8.5	9.0	8.8	9.2	9.1	9.0	8.7	8.9	9.0	10.0	10.5	10.7	11.3	11.1	10.8	10.6	9.3	8.5	8.1	8.5	8.9	8.5	8.7	9.3
Harrisburg, Pa	7.3	7.0	7.4	7.4	7.6	7.5	7.2	7.5	7.7	8.4	8.9	9.6	9.5	10.0	10.2	9.5	9.0	8.5	8.8	8.5	7.3	8.2	8.5	7.7	8.3
Hatteras, N. C	14.6	14.6	14.6	14.9	15.1	15.0	14.2	14.3	13.9	13.5	13.3	12.8	13.6	13.5	13.2	13.8	14.0	14.0	14.9	15.1	15.9	15.7	16.0	15.5	14.4
Havre, Mont	9.8	11.6	11.7	12.2	12.1	11.6	11.4	10.9	10.2	10.2	10.8	10.8	11.7	13.9	14.5	15.1	13.4	11.7	11.0	10.2	10.0	9.2	9.7	8.8	11.3
Helena, Mont	8.8	9.1	8.1	7.2	7.3	6.5	7.7	7.6	7.0	6.3	7.4	6.5	7.3	7.3	8.1	8.1	8.3	8.8	8.4	7.9	8.0	7.5	7.8	7.5	7.7
Huron, S. Dak	10.9	10.7	10.8	10.5	10.5	11.0	10.9	10.9	10.8	10.8	12.1	12.8	13.8	14.3	14.8	15.3	13.7	11.6	10.0	10.1	10.6	10.5	10.6	11.0	11.6
Independence, Cal	4.6	5.2	6.0	5.5	5.5	5.8	5.5	5.2	5.2	5.5	5.7	5.4	6.3	8.0	8.0	7.6	6.7	6.3	6.3	6.1	6.5	5.1	4.7	4.9	5.9
Indianapolis, Ind	11.3	10.3	9.7	10.1	10.2	10.0	10.3	10.1	10.6	11.4	12.2	12.2	12.7	13.2	13.4	13.5	13.3	12.7	12.2	11.4	12.2	11.9	11.3	11.5	11.6
Jacksonville, Fla	6.1	6.6	6.1	6.4	6.8	6.5	6.9	6.6	6.7	7.5	7.7	7.8	8.6	9.2	9.7	9.1	8.6	7.3	5.5	6.1	5.8	5.9	6.3	6.1	7.1
Jupiter, Fla	9.6	10.4	9.7	9.4	9.8	9.6	9.3	9.6	10.6	11.8	12.8	12.9	12.8	12.9	13.0	12.5	11.3	10.2	9.7	9.5	9.4	9.8	10.3	10.0	10.7
Kalispell, Mont	4.6	4.6	4.6	4.3	4.5	4.2	5.3	5.6	5.7	4.9	4.7	5.3	4.7	4.6	4.6	4.0	4.3	4.3	4.4	3.9	4.1	4.6	4.5	4.7	4.6
Kansas City, Mo	8.3	8.4	8.3	8.8	8.7	8.4	8.2	8.3	8.1	8.0	8.9	8.7	10.1	10.1	10.3	10.3	9.7	9.2	7.8	8.1	7.9	7.6	7.8	8.0	8.7
Keokuk, Iowa	8.6	8.2	7.6	7.8	7.5	7.8	8.1	8.1	7.7	8.3	9.5	10.2	10.1	10.1	10.1	10.1	9.9	9.2	7.9	7.2	7.4	7.5	7.9	8.4	8.6
Key West, Fla	10.8	11.2	10.5	10.7	10.7	10.8	11.7	11.8	11.3	11.2	11.5	11.5	12.0	11.9	11.6	11.7	11.4	10.6	10.9	11.7	11.8	11.5	11.3	11.1	11.3
Kittyhawk, N. C	11.6	11.5	11.6	12.0	11.8	11.3	11.8	12.6	12.0	12.4	12.5	11.7	12.2	13.2	13.8	13.7	12.9	12.3	12.0	12.8	12.5	12.4	12.5	12.0	12.3
Knoxville, Tenn	6.1	6.4	6.2	5.4	6.1	6.2	6.2	6.8	6.5	7.3	7.6	7.9	7.9	8.4	8.7	9.5	9.0	8.6	8.2	7.7	7.7	6.9	7.1	7.1	7.3
La Crosse, Wis	8.3	8.2	7.8	7.6	7.7	8.0	7.8	8.1	7.7	7.9	8.5	8.3	8.3	8.2	8.7	8.7	8.1	8.4	8.2	8.4	8.3	8.9	8.0	7.5	8.2
Lander, Wyo	3.0	3.0	2.8	2.7	2.7	2.8	3.3	2.9	2.9	2.6	2.1	2.4	3.4	4.2	5.1	5.1	4.9	4.9	4.4	3.6	3.1	3.2	2.9	2.5	3.4
Lexington, Ky	11.8	11.3	11.2	11.7	11.1	10.9	11.4	10.9	10.9	11.9	12.8	12.6	13.5	13.4	13.2	12.5	11.7	10.6	10.7	10.8	10.4	10.4	10.8	10.5	11.5
Little Rock, Ark	6.4	6.4	6.3	5.9	6.3	6.5	6.5	6.7	7.4	7.9	8.6	9.0	9.3	9.9	9.2	9.3	9.1	8.6	7.1	7.0	7.0	7.1	7.1	6.8	7.6
Los Angeles, Cal	2.1	2.5	2.3	2.3	2.5	2.4	2.7	3.3	2.7	2.5	2.8	2.8	3.4	3.7	3.6	4.2	4.5	4.9	5.4	5.0	3.8	2.7	2.5	1.9	3.2
Louisville, Ky	8.7	8.5	7.7	7.3	7.2	7.3	7.4	7.7	8.0	8.4	9.5	9.6	10.8	11.3	12.0	11.6	10.8	9.8	9.0	9.1	8.5	7.9	8.0	8.0	8.9
Lynchburg, Va	3.2	3.0	3.2	2.8	3.0	3.3	3.3	3.4	3.9	4.7	6.0	6.0	6.1	6.0	6.1	6.1	5.4	4.4	3.6	3.7	3.8	3.7	3.1	3.2	4.2
Macon, Ga	5.7	5.5	5.8	5.5	5.8	5.9	5.7	5.8	5.6	6.5	6.8	7.3	8.1	8.3	8.4	7.8	7.6	6.8	5.7	5.4	6.0	6.0	5.7	5.6	6.4
Marquette, Mich	12.7	11.8	11.8	12.0	12.4	12.6	13.1	13.0	13.8	13.7	13.8	13.9	14.1	13.1	12.8	12.7	12.5	11.8	12.1	12.6	13.1	13.3	12.9	12.8	12.9
Memphis, Tenn	10.2	10.5	9.9	10.0	10.2	9.7	9.3	9.0	9.8	11.1	10.9	11.0	11.1	10.3	10.5	10.0	10.4	10.1	9.2	9.8	10.1	10.4	10.8	10.6	10.2
Milwaukee, Wis	11.4	11.7	11.4	11.6	11.9	12.1	13.1	12.7	12.6	12.6	13.0	13.4	13.5	13.6	13.1	13.1	12.9	11.8	11.5	11.6	11.4	11.6	11.5	11.1	12.3
Minneapolis, Minn	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Mobile, Ala	6.3	6.3	6.0	5.8	5.4	5.4	5.1	5.1	5.3	6.2	6.7	6.7	7.4	7.5	7.7	7.7	7.6	6.9	6.4	5.7	5.0	4.9	4.7	6.2	6.2
Montgomery, Ala	5.6	5.6	5.2	4.7	4.6	4.4	4.7	4.9	5.1	5.7	6.2	6.6	7.1	7.3	7.5	7.1	6.7	5.9	5.2	5.4	5.2	5.5	5.5	5.7	5.7
Moorhead, Minn	9.8	10.6	10.7	10.5	10.5	10.2	10.7	11.3	10.7	10.8	11.7	12.5	12.5	12.7	12.6	12.9	12.5	11.5	10.5	10.3	10.6	10.5	10.8	10.1	11.2
Mount Tamalpais, Cal	16.5	15.6	16.2	15.4	15.5	16.6	18.2	17.7	16.6	16.2	15.8	16.2	16.0	15.4	13.7	12.5	12.2	13.4	14.3	14.0	14.1	13.4	13.5	15.6	15.2
Nantucket, Mass	13.3	13.3	13.1	12.9	13.5	13.1	13.2	13.2	13.3	14.0	14.5	14.3	13.8	14.3	14.4	13.6	12.1	12.1	12.3	13.1	13.8	14.2	14.6	14.0	13.5
Nashville, Tenn	4.5	4.8	4.9	4.9	4.4	4.8	5.0	4.7	4.9	5.6	6.0	6.6	8.1	8.5	8.7	8.7	8.5	7.9	7.5	6.8	6.2	5.5	5.3	5.3	6.2
Neah, Wash	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
New Haven, Conn	9.2	9.0	8.1	8.7	9.4	9.3	9.5	9.6	9.8	10.4	11.3	11.3	11.8	12.5	12.7	13.0	11.5	9.9	9.9	9.2	9.0	8.8	8.7	8.9	10.1
New Orleans, La	7.8	7.3	6.8	6.9	6.6	6.3	6.7	6.6	7.5	8.4	8.2	8.4	8.5	8.7	8.6	8.6	8.0	7.5	6.5	6.6	7.2	7.1	8.0	8.3	7.5

TABLE V.—*Average wind movement, etc.*—Continued.

Stations.	1 a. m.	2 a. m.	3 a. m.	4 a. m.	5 a. m.	6 a. m.	7 a. m.	8 a. m.	9 a. m.	10 a. m.	11 a. m.	Noon.	1 p. m.	2 p. m.	3 p. m.	4 p. m.	5 p. m.	6 p. m.	7 p. m.	8 p. m.	9 p. m.	10 p. m.	11 p. m.	Midnight.	Mean.
New York, N. Y.	15.8	15.9	15.0	15.6	16.3	16.7	16.9	16.9	16.5	16.5	17.7	17.7	18.8	19.1	18.8	19.2	18.5	17.4	18.4	18.3	17.6	17.4	18.4	17.1	17.4
Norfolk, Va.	8.6	8.4	8.3	8.1	8.0	7.9	8.2	7.8	8.1	9.1	10.1	10.3	10.8	10.3	11.1	11.8	11.2	10.3	10.8	9.6	9.9	9.4	9.3	9.7	9.4
Northfield, Vt.	9.5	9.1	9.1	8.8	8.8	8.6	9.5	9.5	9.7	9.5	10.8	10.8	12.1	12.9	13.0	10.9	10.5	10.7	11.2	10.3	9.8	9.6	9.9	9.5	10.2
North Platte, Nebr.	5.7	5.7	6.0	5.6	5.5	5.6	5.7	6.2	6.4	6.5	7.8	9.2	10.1	10.5	10.3	9.9	9.0	8.0	6.5	6.5	5.8	6.3	6.4	6.3	7.1
Oklahoma, Okla.	10.1	9.9	9.1	9.5	9.3	10.1	10.1	10.4	9.6	9.9	11.5	11.9	11.5	11.8	11.5	10.8	11.1	9.5	8.0	7.8	8.0	8.4	9.2	9.5	9.9
Omaha, Nebr.	7.9	7.9	7.0	7.7	7.8	7.8	8.0	8.6	9.3	9.2	10.2	10.4	10.8	10.7	11.0	11.3	11.2	10.1	9.0	8.9	9.1	8.6	8.5	8.1	9.1
Oswego, N. Y.	14.4	13.7	13.8	13.9	13.8	13.5	13.8	13.5	13.4	13.7	14.5	13.7	13.6	13.0	12.9	12.5	12.5	12.6	13.8	14.5	13.9	14.7	15.0	15.1	13.8
Palestine, Tex.	5.5	5.5	5.1	5.4	5.5	5.5	6.0	6.2	5.9	6.7	8.0	7.7	8.3	8.7	9.1	9.2	8.5	8.0	6.4	5.3	4.9	5.1	5.6	5.5	6.6
Parkersburg, W. Va.	6.5	6.5	6.4	6.6	6.1	6.5	6.4	6.3	6.2	7.1	8.1	8.2	9.0	9.5	9.6	9.5	9.1	7.9	7.0	7.0	6.9	7.4	6.8	7.0	7.4
Pensacola, Fla.	8.5	9.0	9.8	10.0	9.5	9.5	9.6	9.5	9.4	9.9	10.4	10.4	11.0	10.7	10.2	10.4	9.9	9.2	7.9	7.4	7.0	7.2	7.9	8.1	9.3
Phenix, Ariz.	2.9	3.2	3.5	3.5	3.6	3.5	3.9	3.7	3.5	4.0	3.9	3.8	4.2	3.6	3.5	3.4	3.2	3.6	3.4	2.4	2.3	2.5	2.5	2.7	3.4
Philadelphia, Pa.	9.1	9.2	9.0	9.3	9.3	9.1	9.7	9.6	10.1	10.6	11.2	11.7	12.1	11.8	12.1	11.6	11.1	10.2	10.0	9.7	9.3	9.1	8.5	8.8	10.1
Pierre, S. Dak.	7.2	6.9	7.5	7.6	7.8	8.2	8.4	8.1	8.4	7.9	9.9	11.0	12.5	12.8	13.4	13.6	12.3	10.1	8.5	7.9	7.4	7.3	7.0	7.2	9.1
Pittsburg, Pa.	7.1	7.0	7.3	7.5	6.9	6.5	6.9	6.7	7.1	7.5	7.8	8.5	8.5	8.8	9.1	9.2	8.5	7.9	7.5	7.5	7.7	7.5	7.0	6.9	7.6
Pocatello, Idaho	11.9	10.8	10.8	10.6	10.8	10.7	10.5	9.2	9.5	9.7	9.3	10.0	11.0	10.9	10.5	10.3	10.5	10.0	10.3	9.1	9.4	10.9	11.4	11.3	10.4
Point Reyes Lt., Cal.	14.9	13.6	12.4	12.0	12.0	12.2	12.8	13.1	13.9	13.9	13.9	14.3	13.6	12.9	12.4	13.2	13.1	13.2	13.8	13.6	14.7	15.1	15.0	15.2	13.5
Port Crescent, Wash.	3.2	3.3	3.1	2.7	2.5	2.7	3.2	3.5	3.4	3.5	3.4	2.8	2.9	2.9	3.3	4.4	4.5	3.8	3.7	3.5	3.0	3.2	3.0	3.1	3.3
Port Huron, Mich.	11.8	11.5	11.5	10.9	10.5	10.1	10.4	10.7	10.5	11.5	12.1	12.9	14.5	14.6	14.2	14.2	13.4	12.7	12.5	12.2	13.0	12.3	12.5	12.4	12.2
Portland, Me.	7.4	7.5	7.4	8.3	8.8	8.3	8.7	9.1	9.4	9.7	9.1	9.1	9.6	10.0	9.4	9.3	8.1	8.5	7.6	7.5	7.2	7.3	8.0	8.0	8.5
Portland, Oreg.	8.8	9.0	8.3	8.1	7.8	8.5	7.5	7.8	8.0	7.9	7.8	7.2	7.6	7.7	8.2	8.9	9.8	9.6	9.2	8.6	8.9	9.0	9.0	9.3	8.4
Pueblo, Colo.	5.2	5.5	6.6	6.6	6.3	5.9	6.4	6.3	6.3	5.3	5.9	6.8	7.2	7.4	7.4	7.2	7.7	8.1	7.7	5.8	4.6	4.2	4.5	5.3	6.3
Raleigh, N. C.	5.0	4.7	4.8	4.7	4.8	5.0	4.5	5.2	6.2	7.3	7.8	7.9	8.5	8.3	8.7	8.5	7.8	6.6	6.2	6.1	6.0	6.2	6.5	6.0	6.4
Rapid City, S. Dak.	6.0	5.8	6.3	6.2	6.2	7.2	8.0	8.0	7.0	7.1	7.0	7.7	8.8	10.3	10.9	11.8	10.2	9.0	6.9	6.1	6.2	6.8	6.1	6.5	7.6
Red Bluff, Cal.	3.8	4.1	4.2	4.7	4.3	4.3	4.3	4.4	4.4	4.9	4.6	4.8	5.1	4.8	4.9	6.0	5.8	5.8	5.7	4.9	4.2	3.7	3.5	3.6	4.6
Richmond, Va.	5.4	5.4	5.6	5.8	5.4	5.3	5.3	5.5	6.1	7.1	7.3	7.7	8.4	8.4	8.8	8.8	8.8	7.1	6.3	5.9	5.7	5.4	5.7	5.9	6.5
Rochester, N. Y.	9.4	9.5	9.5	8.6	9.7	9.9	9.3	9.4	9.8	9.7	10.1	10.3	10.9	10.9	10.3	10.0	8.6	9.2	9.2	9.0	9.2	9.3	9.2	9.8	9.6
Roseburg, Oreg.	2.4	2.6	2.1	2.0	2.5	2.4	2.5	2.3	2.5	2.5	2.7	2.8	2.8	3.2	3.1	3.1	3.2	3.6	3.5	3.1	2.5	3.0	2.0	2.5	2.7
Sacramento, Cal.	6.9	6.9	6.6	6.1	5.8	5.8	5.3	5.9	5.3	5.5	4.9	5.4	5.7	6.0	6.6	7.1	6.4	6.6	6.3	6.0	5.5	5.4	5.3	5.4	5.9
St. Louis, Mo.	10.9	11.0	10.6	10.7	10.8	10.6	10.5	11.0	10.9	10.8	11.5	11.9	12.0	11.8	12.5	12.4	12.1	11.4	10.9	10.7	10.8	10.8	11.1	11.0	11.2
St. Paul, Minn.	9.2	9.1	9.1	8.6	8.1	8.2	7.8	8.1	8.3	8.5	9.7	9.6	10.1	10.2	10.9	11.3	10.9	10.2	10.1	9.7	9.6	9.3	9.6	9.8	9.4
Salt Lake City, Utah	2.3	2.2	2.2	2.7	2.8	3.3	3.0	2.4	2.6	2.7	2.5	2.3	3.4	4.5	5.2	5.4	5.8	5.9	5.7	4.2	3.0	2.3	2.3	2.3	3.4
San Antonio, Tex.	6.6	6.5	6.2	5.2	5.4	6.0	6.7	6.5	6.5	6.3	7.6	8.5	9.6	9.5	9.4	9.8	9.7	9.6	9.5	8.6	8.3	8.4	8.3	7.7	7.8
San Diego, Cal.	2.4	2.6	2.5	2.4	2.2	2.1	2.6	1.9	1.9	2.2	2.6	1.7	2.8	3.6	5.3	7.2	8.0	8.2	7.5	5.7	4.0	2.9	2.4	2.6	3.6
Sandusky, Ohio	9.8	9.4	8.9	8.9	8.8	8.8	8.7	8.5	8.6	8.9	10.1	10.1	11.2	10.9	10.9	10.4	10.6	9.8	9.6	10.4	10.6	11.2	10.6	10.1	9.8
Sandy Hook, N. J.	19.2	18.4	18.5	18.4	17.8	18.0	17.2	16.9	17.0	17.5	18.1	18.8	19.6	19.2	19.5	20.3	19.9	18.9	19.6	19.0	19.8	20.6	19.9	21.0	18.9
San Francisco, Cal.	7.1	6.6	6.8	7.3	7.6	7.3	6.6	6.7	6.8	6.6	6.9	7.2	7.5	7.9	7.2	7.4	8.9	8.6	8.1	7.7	6.8	6.6	6.8	6.6	7.2
San Luis Obispo, Cal.	4.4	3.7	4.2	3.9	3.9	3.8	3.9	4.4	4.5	4.1	4.4	4.9	4.8	5.5	5.7	6.1	7.1	7.0	6.8	6.5	6.1	5.0	4.9	4.4	5.0
Santa Fe, N. Mex.	4.5	4.4	4.4	4.5	4.6	5.0	5.6	5.0	5.6	6.2	6.5	7.7	9.3	10.3	9.8	9.3	9.5	8.8	7.5	4.4	4.5	4.5	4.0	5.1	6.3
Sault Ste. Marie, Mich.	9.7	9.8	10.0	9.9	9.2	8.5	8.5	8.2	8.6	8.6	8.3	9.0	10.1	10.5	11.8	11.3	10.6	9.9	10.2	9.3	8.6	9.4	10.0	9.6	9.6
Savannah, Ga.	5.8	6.2	6.5	6.7	6.5	6.4	6.8	6.9	7.2	8.0	8.7	9.1	9.4	9.6	9.7	9.3	8.6	7.6	7.2	7.0	6.2	6.3	6.1	6.2	7.4
Seattle, Wash.	7.4	7.2	6.9	7.0	7.1	6.9	7.1	6.8	6.1	5.5	5.3	5.3	5.7	5.6	5.6	6.0	6.2	6.0	6.3	6.3	6.3	6.6	6.6	6.3	6.3
Shreveport, La.	6.1	6.4	6.0	5.9	5.9	5.1	6.1	6.1	6.1	6.6	7.2	7.0	7.8	7.7	8.0	8.0	8.3	7.6	6.8	6.8	6.9	6.6	6.5	6.2	6.7
Sioux City, Iowa	11.1	11.3	10.6	11.5	11.4	10.4	11.0	11.2	10.7	11.0	12.0	13.3	15.5	16.2	16.7	17.4	17.3	14.9	13.5	12.4	11.3	11.1	11.0	10.5	12.6
Spokane, Wash.	4.6	4.3	5.0	4.9	4.9	5.2	4.3	4.9	4.6	4.2	4.5	4.6	5.1	5.5	5.5	6.0	5.6	5.6	4.9	4.9	4.5	4.2	4.5	4.6	4.9
Springfield, Ill.	10.3	9.6	9.9	9.7	10.0	10.1	9.8	10.2	9.5	10.3	11.2	11.5	12.5	12.2	11.9	11.2	10.6	10.3	9.6	9.8	9.8	9.7	10.1	9.9	10.4
Springfield, Mo.	9.8	9.9	10.2	9.5	9.7	10.1	9.9	10.2	10.4	11.0	11.1	11.6	11.9	11.6	12.1	12.1	11.5	10.5	9.8	9.9	9.8	10.5	10.2	10.0	10.5
Tacoma, Wash.	6.0	5.9	5.7	4.9	5.2	4.5	4.8	4.9	5.0	4.7	4.4	4.6	4.7	5.0	5.4	5.6	5.8	6.3	6.5	5.7	5.6	6.6	5.8	6.2	5.4
Tampa, Fla.	5.6	5.5	5.9	5.8	5.6	5.6	5.8	5.5	6.2	7.3	8.0	8.4	8.5	8.8	8.6	8.4	7.9	6.3	5.2	4.8	5.0	4.9	4.6	5.0	6.4
Toledo, Ohio	11.3	10.7	10.5	9.8	10.3	10.6	10.1	10.1	10.5	10.9	12.3	13.0	13.9	14.0	13.6	13.2	12.8	11.9	12.0	12.0	11.7	11.5	11.6	11.5	11.6
Vicksburg, Miss.	6.8	6.4	6.7	6.9	7.0	7.3	7.1	6.7	7.3	7.8	7.0	7.1	7.8	8.4	7.8	8.0	7.3	6.8	5.6	6.2	6.3	6.4	6.7	6.9	7.0
Vineyard Haven, Mass.	10.3	10.0	10.8	10.5	10.5	9.8	9.6	9.8	10.5	12.1	12.5	12.2	12.0	12.2	12.5	11.8	11.2	10.4	10.5	11.1	11.5	11.4	10.8	10.9	11.0
Walla Walla, Wash.	6.5	6.0	5.1	5.2	5.9	5.3	5.1	4.8	5.3	5.3	5.2	4.4	4.8	5.4	5.6	5.5	5.5	5.4	5.5	5.5	5.7	5.3	5.9	5.6	5.4
Washington, D. C.	6.4	6.5	6.0	6.5	5.8	5.6	6.0	6.0	6.7	7.8	9.2	10.3	10.7	10.5	10.6	9.8	8.5	6.9	6.4	6.5	6.5	7.2	7.2	6.8	7.5
Wichita, Kans.	6.9	8.2	8.3	7.9	7.7	7.5	7.3	6.7	7.0	7.3	8.3	8.5	9.1	9.4	10.0	10.2	9.8	9.1	7.5	6.6	6.3	6.6	6.4	6.4	7.9
Williston, N. Dak.	8.6	7.7	7.7	7.5	7.2	7.7	7.5	7.9	6.8	7.2	7.5	7.2	9.3	11.2	11.7	11.5	11.5	10.4	8.3	7.1	7.3	7.7	7.3	7.3	8.4
Wilmington, N. C.	7.3	6.9	6.9	6.6	7.4	6.7	6.3	7.2	8.1	8.2	9.1	9.1	9.1	10.0	10.5	11.2	10.0	7.9	7.0	7.5	7.2	7.5	7.7	7.5	8.0
Winnemucca, Nev.	7.9	8.0	8.1	8.2	9.1	8.4	8.2	8.6	9.2	9.6	9.7	9.3	10.4	10.3	10.6	9.7	10.5	9.9	9.0	8.0	7.4	7.1	7.3	7.5	8.8
Woods Hole, Mass.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yankton, S. Dak.	8.3	8.1	8.1	7.0	7.5	7.6	7.9	8.2	7.6	8.0	9.3	10.4	11.9	11.5	11.8	12.0	11.3	9.8	8.4	7.4	7.5	7.9	7.5	8.0	8.9
West Indies.																									
Basseterre, St. Kitts	10.0	10.1	10.0	10.1	9.9	9.8	10.0	11.6	12.5	12.8	12.9	12.9	12.6	12.2	12.0	11.3	10.5	9.6	9.9	10.3	10.2	10.0	10.4	9.8	10.9
Bridgetown, Bar.	5.9	6.0	5.7	5.7	5.5	5.2	6.5	10.4	12.7	13.7	13.7	13.3	13.3	12.9	12.5	11.5	9.3	6.7	6.2	6.5	6.2	5.8	6.0	5.8	8.6
Cienfuegos, Cuba	5.4	5.8	5.5	5.5	5.0	5.5	4.9	5.3	5.5	7.4	8.7	8.7	9.5	10.0	9.9	10.0	9.9	8.9	7.3	7.2	6.7	6.3	6.3	6.0	7.1
Havana, Cuba	7.3	7.4	7.2	7.5	7.4	6.8	6.9	6.4	7.5	10.0	12.5	13.4	13.3	14.1	14.8	15.0	14.6	13.0	11.5	11.0	10.1	9.6	8.9	8.0	10.2
Kingston, Jamaica*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port of Spain, Trin.	1.7	1.4	1.7	1.6	1.6	1.7	1.7	3.2	4.5	5.2	5.7	5.6	6.0	5.9	5.8	5.8	4.7	3.2	2.4	2.1	1.9	1.7	1.7	1.7	3.3
Puerto Principe, Cuba	4.3	4.5	4.3	4.1	3.6	4.1	4.0	4.4	6.4	9.2	10.0	10.1	10.0	9.4	9.4	9.5	9.3	7.6	5.9	5.7	5.7	5.5	5.3	4.8	6.5
Roseau, Dominica	4.8	4.3	4.1	4.2	3.9	3.8	3.9	4.3	5.7	6.6	7.0	7.1	7.2	7.5	7.5	7.1	6.1	5.1	4.6	4.5	5.1	4.5	4.8	4.9	5.4
San Juan, Puerto Rico	7.7	7.5	6.6	6.4	5.8	7.1	7.0	8.0	10.0	12.7	15.3	16.0	17.4	16.6	16.0	15.9	14.5	12.6	12.2	11.2	10.2	9.9	9.2	8.6	11.0
Santiago de Cuba	3.5	3.5	3.7	3.6	3.5	3.6	3.6	3.8	5.3	6.8	7.1	7.8	8.2	8.0	7.8	6.7	5.9	4.8	4.3	4.3	4.4	4.0	3.7	3.5	5.1
Santo Domingo, S. D.	4.5	4.7	5.0	5.0	5.2	5.0	5.0	5.1	6.1	6.0	6.4	6.7	6.5	6.7	6.8	6.7	6.2	5.1	4.4	4.6	4.6	4.4	4.5	4.5	5.4
Willemstad, Curaçao	8.4	8.5	8.8	8.5	8.2	8.0	8.0	10.2	12.5	13.1	13.7	13.7	13.6	13.5	13.6	13.1	12.7	11.1	10.1	9.5	9.5	9.1	9.3	9.3	10.6

*Incomplete.

TABLE VI.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of January, 1900.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	Hours.	Hours.	Hours.	°	Hours.
New England.						
Eastport, Me	16	13	10	34	n. 83 w.	24
Portland, Me	22	16	4	33	n. 78 w.	30
Northfield, Vt	23	34	1	8	s. 32 w.	13
Boston, Mass	17	16	7	33	n. 88 w.	26
Nantucket, Mass	25	20	9	24	n. 72 w.	16
Woods Hole, Mass	25	12	12	26	n. 47 w.	19
Block Island, R. I	19	14	11	35	n. 78 w.	24
New Haven, Conn	29	11	13	23	n. 29 w.	21
Middle Atlantic States.						
Albany, N. Y	18	25	5	20	s. 65 w.	17
Binghamton, N. Y.†	12	9	2	17	n. 79 w.	15
New York, N. Y	25	14	12	28	n. 56 w.	19
Harrisburg, Pa.†	9	6	10	14	n. 53 w.	5
Philadelphia, Pa	26	12	11	27	n. 49 w.	21
Atlantic City, N. J	20	18	10	32	n. 85 w.	22
Cape May, N. J.	24	16	10	27	n. 65 w.	19
Baltimore, Md	15	15	17	29	w.	12
Washington, D. C	25	17	12	22	n. 51 w.	13
Lynchburg, Va	26	15	15	37	n. 47 w.	16
Norfolk, Va	20	23	16	18	s. 34 w.	4
Richmond, Va	22	23	9	17	s. 83 e.	8
South Atlantic States.						
Charlotte, N. C	21	20	19	18	n. 45 e.	1
Hatteras, N. C	33	14	12	22	n. 29 w.	21
Raleigh, N. C	27	17	9	25	n. 58 w.	19
Wilmington, N. C	23	13	16	22	n. 31 w.	12
Charleston, S. C	29	10	12	21	n. 25 w.	21
Augusta, Ga	20	10	8	36	n. 70 w.	30
Savannah, Ga	27	12	12	20	n. 28 w.	17
Jacksonville, Fla	35	5	21	18	n. 6 e.	30
Florida Peninsula.						
Jupiter, Fla	23	10	18	37	n. 56 w.	23
Key West, Fla	35	7	24	10	n. 27 e.	31
Tampa, Fla	37	5	14	21	n. 12 w.	33
Eastern Gulf States.						
Atlanta, Ga	19	14	18	30	n. 67 w.	13
Macon, Ga	15	3	4	13	n. 37 w.	15
Pensacola, Fla.†	18	2	13	6	n. 24 e.	18
Mobile, Ala	35	11	12	20	n. 18 w.	25
Montgomery, Ala	20	9	24	19	n. 24 e.	12
Meridian, Miss.†	10	7	10	11	n. 18 w.	3
Vicksburg, Miss	22	18	23	12	n. 70 e.	12
New Orleans, La	31	10	17	15	n. 5 e.	21
Western Gulf States.						
Shreveport, La	17	20	20	13	s. 67 e.	8
Fort Smith, Ark	17	11	24	17	n. 34 e.	7
Little Rock, Ark	23	21	12	23	n. 80 w.	11
Corpus Christi, Tex	27	16	26	8	n. 59 e.	21
Fort Worth, Tex†	11	10	7	10	n. 72 w.	3
Galveston, Tex	23	18	28	10	n. 74 e.	19
Palestine, Tex	25	25	17	8	e.	9
San Antonio, Tex	29	18	26	5	n. 62 e.	24
Ohio Valley and Tennessee.						
Chattanooga, Tenn	13	24	14	26	s. 47 w.	16
Knoxville, Tenn	23	16	21	22	n. 8 w.	7
Memphis, Tenn	19	25	15	19	s. 34 w	7
Nashville, Tenn	19	22	14	21	s. 67 w.	8
Lexington, Ky	4	17	8	13	s. 21 w.	14
Louisville, Ky	14	30	9	25	s. 45 w.	23
Evansville, Ind.†	10	14	5	8	s. 37 w.	5
Indianapolis, Ind	19	20	10	25	s. 86 w.	15
Cincinnati, Ohio	16	24	17	23	s. 37 w.	10
Columbus, Ohio	11	23	15	28	s. 47 w.	18
Pittsburg, Pa	17	22	10	29	s. 75 w.	20
Parkersburg, W. Va	14	29	11	22	s. 36 w.	19
Elkins, W. Va	13	19	5	35	s. 79 w.	31
Lower Lake Region.						
Buffalo, N. Y	15	21	10	31	s. 74 w.	22
Oswego, N. Y	15	31	16	17	n. 3 w.	16
Rochester, N. Y	12	24	6	37	s. 69 w.	33
Erie, Pa	18	20	7	29	s. 85 w.	22
Cleveland, Ohio	12	21	14	20	s. 34 w.	11
Sandusky, Ohio	11	21	15	30	s. 56 w.	18
Toledo, Ohio	11	23	12	28	s. 58 w.	20
Detroit, Mich	13	22	12	28	s. 61 w.	18
Upper Lake Region.						
Alpena, Mich	21	17	5	33	n. 82 w.	28
Escanaba, Mich	24	20	4	33	n. 82 w.	29
Grand Haven, Mich	24	15	17	21	n. 24 w.	10
Marquette, Mich	14	25	5	32	s. 68 w.	30
Port Huron, Mich	14	23	9	23	s. 57 w.	17
Sault Ste. Marie, Mich	14	20	24	18	s. 45 e.	8
Chicago, Ill	17	17	15	28	w.	13
Milwaukee, Wis.	15	16	9	34	s. 88 w.	25
Green Bay, Wis	16	27	6	27	s. 62 w.	24
Duluth, Minn	18	22	4	40	s. 84 w.	36
North Dakota.						
Moorhead, Minn	18	25	13	36	s. 62 w.	15
Bismarck, N. Dak	25	13	10	33	n. 61 w.	26
Williston, N. Dak	5	0	60	0	n. 86 e.	60
Upper Mississippi Valley.						
St. Paul, Minn	20	22	10	28	s. 84 w.	18
La Crosse, Wis. †	9	12	2	11	s. 72 w.	10
Davenport, Iowa	17	16	8	35	n. 88 w.	27
Des Moines, Iowa	25	14	14	21	n. 32 w.	13
Dubuque, Iowa	19	19	9	29	w.	20
Keokuk, Iowa	24	18	9	27	n. 72 w.	19
Cairo, Ill	18	27	11	20	s. 45 w.	13
Springfield, Ill	26	18	7	24	n. 65 w.	19
Hannibal, Mo	11	8	4	13	n. 72 w.	10
St. Louis, Mo	19	19	14	22	w.	8
Missouri Valley.						
Columbia, Mo.*	10	9	7	12	n. 79 w.	5
Kansas City, Mo	24	22	12	23	n. 80 w.	11
Springfield, Mo	20	27	14	17	s. 23 w.	8
Lincoln, Nebr	23	24	10	16	s. 80 w.	6
Omaha, Nebr	27	19	12	19	n. 41 w.	11
Sioux City, Iowa†	11	12	4	10	s. 80 w.	6
Pierre, S. Dak	22	17	15	24	n. 54 w.	9
Huron, S. Dak	18	21	14	25	s. 75 w.	11
Yankton, S. Dak†	9	4	6	15	n. 61 w.	10
Northern Slope.						
Havre, Mont	11	16	7	44	s. 82 w.	37
Miles City, Mont	16	24	5	27	s. 70 w.	23
Helena, Mont	12	28	3	36	s. 64 w.	37
Kalispell, Mont	24	17	3	21	n. 69 w.	19
Rapid City, S. Dak	25	9	11	33	n. 54 w.	27
Cheyenne, Wyo	27	12	2	35	n. 66 w.	36
Lander, Wyo	11	30	14	26	s. 32 w.	22
North Platte, Nebr	19	11	5	37	n. 76 w.	33
Middle Slope.						
Denver, Colo	17	27	10	21	s. 48 w.	15
Pueblo, Colo	22	7	22	26	n. 15 w.	16
Concordia, Kans	17	30	10	16	s. 25 w.	14
Dodge, Kans	32	14	9	22	n. 36 w.	22
Wichita, Kans	32	20	10	13	n. 14 w.	12
Oklahoma, Okla	26	26	11	10	e.	1
Southern Slope.						
Abilene, Tex	20	25	15	19	s. 39 w.	6
Amarillo, Tex	27	20	8	18	n. 55 w.	12
Southern Plateau.						
El Paso, Tex	21	8	13	34	n. 59 w.	25
Santa Fe, N. Mex	29	20	21	4	n. 62 e.	19
Flagstaff, Ariz	21	12	22	21	n. 6 e.	9
Phenix, Ariz	18	9	28	22	n. 56 e.	7
Yuma, Ariz	38	6	17	12	n. 9 e.	32
Independence, Cal	23	22	9	22	n. 86 w.	13
Middle Plateau.						
Carson City, Nev	18	19	18	24	s. 80 w.	6
Winnemucca, Nev	22	13	22	17	n. 29 e.	10
Cedar City, Utah	14	26	25	14	s. 43 e.	16
Salt Lake City, Utah.	22	15	13	26	n. 62 w.	15
Grand Junction, Colo	21	16	27	14	n. 69 e.	14
Northern Plateau.						
Baker City, Oreg	7	40	16	11	s. 9 e.	33
Boise, Idaho	15	19	15	30	s. 75 w.	16
Pocatello, Idaho	15	30	13	16	s. 11 w.	15
Spokane, Wash	16	27	19	13	s. 29 e.	12
Walla Walla, Wash	7	40	4	20	s. 23 w.	40
North Pacific Coast Region.						
Neah, Wash	......	......	......	......	......	......
Port Crescent, Wash.*	0	11	14	11	s. 15 e.	11
Seattle, Wash	14	35	23	3	s. 61 e.	23
Tacoma, Wash	10	35	7	18	s. 24 w.	27
Astoria, Oreg	15	17	34	13	s. 85 e.	21
Portland, Oreg	14	28	20	15	s. 20 e.	15
Roseburg, Oreg	21	14	20	23	n. 23 w.	8
Middle Pacific Coast Region.						
Eureka, Cal	21	21	22	15	e.	7
Mount Tamalpais, Cal	24	19	21	16	n. 45 e.	7
Red Bluff, Cal	23	22	17	16	n. 45 e.	1
Sacramento, Cal	17	33	26	5	s. 53 e.	26
San Francisco, Cal	31	15	12	16	n. 14 w.	16
South Pacific Coast Region.						
Fresno, Cal	31	8	12	33	n. 42 w.	31
Los Angeles, Cal	20	10	13	29	n. 58 w.	19
San Diego, Cal	28	10	11	27	n. 42 w.	24
San Luis Obispo, Cal	34	12	5	12	n. 18 w.	23
West Indies.						
Basseterre, St. Kitts Island	21	0	53	0	n. 69 e	57
Bridgetown, Barbados	28	2	50	0	n. 63 e.	56
Cienfuegos, Cuba	45	6	20	5	n. 21 e.	42
Havana, Cuba	22	9	35	8	n. 64 e.	30
Kingston, Jamaica‡	......	......	......	......	......	......
Port of Spain, Trinidad	24	7	42	3	n. 66 e.	42
Puerto Principe, Cuba	39	5	30	4	n. 38 e.	43
Roseau, Dominica, W. I	23	6	44	6	n. 66 e.	42
San Juan, Puerto Rico.	5	27	45	2	s. 63 e.	48
Santiago de Cuba, Cuba	35	17	19	6	n. 36 e.	22
Santo Domingo, S. Domingo, W. I.	48	5	11	5	n. 8 e.	43
Willemstad, Curaçao	5	0	60	0	n. 85 e.	60

* From observations at 8 p. m. only. † From observations at 8 a. m. only. ‡ Incomplete.

TABLE VII.—*Thunderstorms and auroras, January, 1900.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.									3	5	2							3	1													14	5	T.
		A.																																0	0	A.
Arizona	56	T.		1		1				3						1																		6	4	T.
		A.																																0	0	A.
Arkansas	57	T.									5							7	3					2	2									19	5	T.
		A.																																0	0	A.
California	167	T.	1						1																									2	2	T.
		A.																																0	0	A.
Colorado	81	T.																																0	0	T.
		A.								1																1								2	2	A.
Connecticut	21	T.																																0	0	T.
		A.																																0	0	A.
Delaware	5	T.																																0	0	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.																																0	0	T.
		A.																																0	0	A.
Florida	47	T.										2	8												1	2						1		14	5	T.
		A.																																0	0	A.
Georgia	55	T.										5	11						5	1													1	23	5	T.
		A.																																0	0	A.
Idaho	34	T.																																0	0	T.
		A.																					1											1	1	A.
Illinois	92	T.																	1															1	1	T.
		A.																				4									1			5	2	A.
Indiana	58	T.																																0	0	T.
		A.																																0	0	A.
Indian Territory	11	T.																																0	0	T.
		A.																																0	0	A.
Iowa	149	T.																																0	0	T.
		A.																				5		1										6	2	A.
Kansas	77	T.																						5										5	1	T.
		A.																													1			1	1	A.
Kentucky	41	T.																		3														3	1	T.
		A.																																0	0	A.
Louisiana	46	T.																		1	2	1	6	2	2	9	2					1		26	9	T.
		A.																																0	0	A.
Maine	19	T.																																0	0	T.
		A.																																0	0	A.
Maryland	48	T.											4									6												10	2	T.
		A.																																0	0	A.
Massachusetts	48	T.																																0	0	T.
		A.																																0	0	A.
Michigan	106	T.																								10								10	1	T.
		A.					1							1								5	1											8	4	A.
Minnesota	67	T.																																0	0	T.
		A.			1	1	2															12				1		2						19	6	A.
Mississippi	44	T.									3	6	3						3															15	4	T.
		A.																																0	0	A.
Missouri	95	T.																3	2					3										8	3	T.
		A.																																0	0	A.
Montana	40	T.																																0	0	T.
		A.					1													1		3	2		1	2	2	1						13	8	A.
Nebraska	142	T.																																0	0	T.
		A.																				1												1	1	A.
Nevada	40	T.																																0	0	T.
		A.																																0	0	A.
New Hampshire	19	T.																																0	0	T.
		A.																																0	0	A.
New Jersey	51	T.																																0	0	T.
		A.																1																1	1	A.
New Mexico	31	T.								3																								3	1	T.
		A.																																0	0	A.
New York	99	T.																				1	1											2	2	T.
		A.																																0	0	A.
North Carolina	56	T.										1	6	4						1	1	1												14	6	T.
		A.																																0	0	A.
North Dakota	48	T.																																0	0	T.
		A.			1																	2	1			1		1					1	7	6	A.
Ohio	128	T.																																0	0	T.
		A.																																0	0	A.
Oklahoma	23	T.																																0	0	T.
		A.																																0	0	A.
Oregon	74	T.			2				2																									4	2	T.
		A.																																0	0	A.
Pennsylvania	91	T.																																0	0	T.
		A.																																0	0	A.
Rhode Island	7	T.																																0	0	T.
		A.																																0	0	A.
South Carolina	46	T.										2	7	1				1	2															13	5	T.
		A.																																0	0	A.
South Dakota	56	T.																																0	0	T.
		A.					1		1													9	1											12	4	A.
Tennessee	56	T.										1	5							9		1												16	4	T.
		A.																																0	0	A.
Texas	95	T.					4	1		4	14	14	1					8	3															49	8	T.
		A.																																0	0	A.
Utah	47	T.																																0	0	T.
		A.																								1								1	1	A.
Vermont	16	T.																																0	0	T.
		A.																																0	0	A.
Virginia	50	T.											4	1								3												8	3	T.
		A.																																0	0	A.
Washington	64	T.			1																													1	1	T.
		A.																																0	0	A.
West Virginia	43	T.																																0	0	T.
		A.																																0	0	A.
Wisconsin	60	T.																																0	0	T.
		A.																				7	1					1						9	3	A.
Wyoming	31	T.																																0	0	T.
		A.																															1	1	1	A.
Sums	2,893	T.	1	1	3	1	4	1	3	10	25	36	51	6	0	1	0	19	19	18	4	13	7	12	5	21	2	0	0	0	0	2	1	266	....	T.
		A.	0	0	2	1	5	0	1	1	0	0	0	1	0	0	0	1	0	1	0	48	7	1	1	6	2	5	0	0	2	0	2	87	....	A.

TABLE VIII.—*Average hourly sunshine (in percentages), January, 1900.*

Stations.	Instrument.	Percentages for each hour of local mean time ending with the respective hour. A. M. 5	6	7	8	9	10	11	Noon	P. M. 1	2	3	4	5	6	7	8	Hours of sunshine. Total. Actual.	Possible.	Percent of possible.	Personal estimate.
																		Hours.	Hours.		
Albany, N. Y.	T.				10	19	40	51	63	63	60	47	41	35	22			130.3	292.7	45	32
Atlanta, Ga	T.			70	42	53	59	69	68	64	65	71	60	45	44			187.8	316.2	59	52
Atlantic City, N. J.	T.				48	56	69	69	76	75	70	72	54	45	37			193.4	303.8	64	50
Baltimore, Md	T.				21	34	56	57	72	69	64	56	49	37	63			159.6	303.8	53	38
Binghamton, N. Y.	T.				5	10	21	30	39	42	40	31	22	15	15			78.3	295.5	26	21
Bismarck, N. Dak.	P.				53	50	52	62	62	60	63	64	56	50	0			161.1	279.9	58	55
Boston, Mass.	T.				39	40	44	53	60	63	69	57	48	41	31			153.5	295.5	52	41
Buffalo, N. Y.	T.				19	25	48	63	55	57	54	48	35	17	0			127.2	292.7	43	19
Cedar City, Utah	T.				49	55	70	84	87	92	93	85	72	50	63			226.9	306.5	74	56
Charleston, S. C.	T.			22	51	55	65	63	71	61	53	55	54	45	40			180.6	318.5	57	55
Chattanooga, Tenn	T.			0	26	28	36	54	60	54	56	49	48	33	38			143.0	314.6	45	50
Cheyenne, Wyo	P.				57	71	78	83	71	72	80	75	69	69	65			218.2	298.4	73	59
Chicago, Ill.	T.				22	29	32	35	44	49	47	37	39	34	38			110.8	295.5	37	36
Cincinnati, Ohio	T.				37	38	35	46	45	52	54	55	51	43	60			139.7	303.8	46	43
Cleveland, Ohio	T.				7	5	13	26	31	31	29	26	14	10	8			58.3	295.5	20	24
Columbia, Mo.	T.				63	65	65	64	68	62	64	66	61	53	80			192.1	303.8	63	47
Columbus, Ohio	T.				24	22	30	46	50	44	47	47	41	41	58			119.5	301.1	40	35
Denver, Colo	P.				66	72	77	83	84	90	88	81	78	63	75			236.8	301.1	79	70
Des Moines, Iowa	T.				40	37	45	59	64	66	64	65	59	52	62			164.4	295.5	56	45
Detroit, Mich.	T.				7	15	25	29	38	41	42	29	18	15	31			79.8	295.5	27	23
Dodge, Kans	P.				67	68	70	72	72	71	76	81	77	75	69			223.7	306.5	73	65
Dubuque, Iowa	T.				33	33	36	49	51	54	54	42	38	44	46			130.0	295.5	44	51
Eastport, Me.	P.				34	39	42	45	49	51	48	44	42	38	33			125.6	286.7	44	35
Elkins, W. Va.	T.				7	6	20	36	45	45	45	45	25	13	13			88.7	303.8	29	32
Erie, Pa	T.				10	11	16	23	29	30	31	25	17	13	8			62.3	295.5	21	19
Escanaba, Mich	T.				3	5	9	16	30	28	32	20	15	11	0			50.8	283.1	18	17
Eureka, Cal.	P.				24	31	41	50	48	51	54	48	42	38	59			129.5	298.4	43	35
Fresno, Cal.	T.				6	7	8	13	15	17	22	25	22	17	6			46.6	309.0	15	16
Galveston, Tex	P.			18	32	42	49	48	46	55	61	63	66	54	23			164.2	326.8	50	42
Grand Junction, Colo	P.				74	66	73	74	71	74	71	74	70	72	90			219.1	303.8	72	63
Harrisburg, Pa.	T.				27	29	42	50	48	46	43	37	37	29	25			118.2	301.1	39	34
Helena, Mont	P.				17	25	48	61	51	57	57	58	46	36	0			134.3	279.9	48	43
Huron, S. Dak	T.				56	52	48	61	67	69	72	71	65	65	67			182.5	289.7	63	53
Indianapolis, Ind.	T.				40	51	54	59	61	58	55	57	45	39	58			157.3	301.1	52	37
Jacksonville, Fla.	T.			25	30	37	52	60	69	65	65	57	44	33	30			160.6	325.0	49	51
Jupiter, Fla	T.			13	18	48	61	74	71	74	71	57	44	38	36			178.9	330.9	54	43
Kalispell, Mont.	T.				10	17	28	31	36	44	47	44	33	31				94.3	276.2	34	34
Kansas City, Mo.	P.				51	52	56	53	56	57	63	69	65	62	83			178.7	303.8	59	58
Key West, Fla	T.			39	40	48	57	71	75	75	79	73	60	55	55			208.7	334.2	62	48
Knoxville, Tenn	T.				20	20	35	53	56	54	58	45	35	32	41			128.2	311.8	41	41
Lexington, Ky.	T.				12	33	42	45	54	52	52	47	39	28	15			125.0	306.5	41	39
Little Rock, Ark	T.			100	29	34	46	56	60	57	54	50	44	30	33			144.3	314.6	46	42
Los Angeles, Cal	P.			0	47	61	67	71	68	69	75	75	68	46	46			203.5	316.2	64	51
Louisville, Ky	T.				33	33	47	52	61	58	62	55	50	25	33			145.7	306.5	48	45
Macon, Ga	T.			50	30	41	61	66	68	74	66	62	51	45	44			178.6	318.5	56	53
Meridian, Miss	T.			75	29	28	38	53	56	58	53	52	47	45	46			147.4	320.5	46	45
Mount Tamalpais, Cal	P.				44	48	50	49	55	56	63	65	62	52	46			167.5	306.5	55	42
Nashville, Tenn	T.				17	24	40	47	55	56	55	54	50	34	37			135.2	311.8	43	40
New Haven, Conn	T.				54	58	62	69	72	76	75	68	49	39	41			186.5	298.4	62	55
New Orleans, La.	T.			21	13	17	32	40	54	57	53	46	20	17	33			112.8	324.9	35	48
New York, N. Y.	T.				48	54	65	69	75	76	69	59	51	36	53			181.4	298.4	61	50
Norfolk, Va.*	T.				27	54	61	68	68	65	66	68	62	43	34			151.7	260.5	58	55
Northfield, Vt	P.				32	33	43	43	38	37	40	42	28	17	10			103.5	289.7	36	28
Oklahoma, Okla	T.			0	49	52	60	62	65	68	68	64	61	54	60			189.9	314.6	60	52
Omaha, Nebr	T.				37	35	44	57	70	73	71	69	51	43	59			166.8	298.4	56	55
Parkersburg, W. Va	T.				20	19	40	45	57	63	63	46	40	26	40			129.4	303.8	43	40
Phenix, Ariz	P.			100	59	71	81	86	86	85	82	87	80	63	59			246.5	318.5	77	65
Philadelphia, Pa	T.				58	60	63	65	76	74	67	53	51	42	54			184.1	301.1	61	43
Pittsburg, Pa	T.				18	18	23	27	30	38	41	35	23	19	12			82.2	298.4	28	33
Pocatello, Idaho	T.				32	30	43	50	52	62	62	56	48	43	67			142.2	292.7	49	40
Portland, Me	T.				32	42	49	56	58	61	65	65	48	33	33			150.7	289.7	52	39
Portland, Oreg	T.				13	14	24	34	42	49	43	37	35	38	45			95.8	283.1	34	30
Pueblo, Colo	T.				64	65	79	84	84	84	83	79	71	60	67			230.9	306.5	75	68
Raleigh, N. C	T.				41	53	60	61	71	73	75	67	58	47	42			188.7	311.8	61	54
Rochester, N. Y	T.				6	7	18	29	39	35	40	45	35	21	22			83.8	292.7	29	25
St. Louis, Mo	T.				39	46	55	65	69	74	71	62	50	36	53			173.6	303.8	57	42
St. Paul, Minn	P.				26	32	50	54	54	53	52	52	42	34	67			132.4	286.7	46	43
Salt Lake City, Utah	P.				45	45	46	50	55	58	57	61	52	53	76			156.6	298.4	52	50
San Diego, Cal	P.			0	47	51	64	82	80	81	84	79	74	65	66			224.7	318.5	71	63
San Francisco, Cal	T.				22	24	33	41	59	67	68	67	50	43	41			146.8	306.5	48	42
Santa Fe, N. Mex	P.				81	85	91	88	89	90	90	91	87	71	78			268.8	311.8	86	77
Sault Ste. Marie, Mich	T.				9	10	25	36	37	40	30	19	13	14	0			69.5	283.1	25	23
Savannah, Ga	T.			50	42	44	50	66	61	57	57	56	48	45	43			167.6	320.5	52	50
Seattle, Wash	T.				16	12	26	26	32	42	39	32	25	26				78.9	276.2	29	32
Spokane, Wash	T.				18	13	14	23	29	38	34	35	27	31				73.0	276.2	26	24
Tacoma, Wash	T.				13	15	30	30	36	45	35	30	25	24	0			82.9	279.9	30	21
Tampa, Fla	T.			30	29	49	65	74	74	73	68	60	45	25	25			179.2	328.7	55	39
Toledo, Ohio	T.				7	22	39	41	48	56	48	42	31	17	15			107.7	295.5	36	32
Topeka, Kans	T.				48	51	56	61	59	65	66	62	56	55	53			176.6	303.8	58	50
Vicksburg, Miss	T.			50	36	51	52	67	67	72	70	66	62	48	42			187.8	320.5	59	47
Washington, D. C.	P.				44	49	57	64	64	66	66	66	54	49	47			176.8	303.8	58	56
Wilmington, N. C.	T.			0	38	48	65	70	70	78	74	65	53	44	38			188.6	316.2	60	55
Yankton, S. Dak	T.				44	50	60	65	70	69	68	67	62	52	67			179.3	292.7	61	58
Basseterre, St. Kitts	T.			43	48	79	88	97	96	93	96	93	94	81	70			291.4	348.9	84	54
Bridgetown, Barbados	T.			37	63	70	82	91	86	80	76	66	68	65	47	0		251.8	355.5	71	40
Cienfuegos, Cuba	T.			52	52	64	72	80	75	75	73	66	54	51	53			221.0	340.6	65	55
Havana, Cuba	T.			42	40	52	59	65	66	58	52	49	42	30	21			167.5	338.3	50	37
Kingston, Jamaica, W. I	T.																				
Port of Spain, Trinidad, W. I.	T.			63	62	71	74	76	77	73	58	54	53	51	37	50		224.0	359.0	62	47
Puerto Principe, Cuba	T.			32	36	61	69	67	68	56	49	41	33	25	24			164.6	342.1	48	41
Roseau, Dominica, W. I.	T.			10	20	52	69	75	62	66	70	75	76	72	48			211.4	352.5	60	52
San Juan, Puerto Rico	T.			18	41	69	84	95	93	91	86	77	65	58	22			241.1	347.5	69	60
Santiago de Cuba, Cuba	T.			69	69	70	68	79	89	85	78	69	55	41	33			233.6	344.0	68	50
Santo Domingo, Santo Domingo	T.			57	56	59	75	77	69	67	71	64	55	59	63			224.6	347.5	65	61
Willemstad, Curaçao	T.			10	11	43	47	66	56	55	60	50	43	26	16	18		148.1	357.6	41	45

*All values for 26 days.

TABLE IX.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during January, 1900, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total am't of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	*Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	20-21			0.86														*			
Atlanta, Ga.	10-11			0.84														0.46			
Atlantic City, N. J.	20			0.78														*			
Baltimore, Md.	11-12			1.03														*			
Binghamton, N. Y.	19-20			0.26														0.06			
Bismarck, N. Dak.	14-15			0.20														*			
Boise, Idaho	13-14			0.47														0.11			
Boston, Mass.	11-12			0.65														0.54			
Buffalo, N. Y.	20			1.00														0.20			
Cairo, Ill.	19-20			1.10														0.10			
Charleston, S. C.	18			0.64														0.46			
Chicago, Ill.	17-18			0.88														*			
Cincinnati, Ohio	18			0.35														0.26			
Cleveland, Ohio	11			1.09														0.22			
Columbia, Mo.	17			1.27														0.17			
Columbus, Ohio	19-20			1.75														0.32			
Denver, Colo.	15-16			0.11														0.01			
Des Moines, Iowa	8-9			0.18														*			
Detroit, Mich.	11			0.46														*			
Dodge, Kans.	9			0.14														0.05			
Duluth, Minn.	13			0.24														*			
Eastport, Me.	20-21			1.72														0.37			
Elkins, W. Va.	19-20			0.70														0.21			
Erie, Pa.	11-12			0.94														*			
Escanaba, Mich.	9			0.23														0.08			
Evansville, Ind.	11			0.69														0.12			
Fort Worth, Tex.	10-11			0.36														0.11			
Fresno, Cal.	2-3			1.28														0.21			
Galveston, Tex.	10			0.82														0.60			
Grand Junction, Colo.	15			0.13														*			
Hannibal, Mo.	16-18			1.49														0.19			
Harrisburg, Pa.	10-11			0.78														0.15			
Hatteras, N. C.	11-12			1.14											0.45						
Huron, S. Dak.	10			0.02														*			
Indianapolis, Ind.	11			0.54														0.09			
Jacksonville, Fla.	11			0.47														0.28			
Jupiter, Fla.	11-12			1.01														0.59			
Kalispell, Mont.	9-10			0.30														*			
Kansas City, Mo.	9			0.15														0.12			
Key West, Fla.	19			0.73														0.66			
Knoxville, Tenn.	11			0.73														0.20			
Lexington, Ky.	11			0.84														0.10			
Lincoln, Nebr.	8-9			0.13														*			
Little Rock, Ark.	17			0.86														0.28			
Los Angeles, Cal.	3			1.16														0.24			
Louisville, Ky.	11			1.26														0.14			
Macon, Ga.	11			0.92														0.25			
Memphis, Tenn.	17-18			0.42														0.32			
Meridian, Miss.	10-11			1.73														0.25			
Milwaukee, Wis.	17-18			0.68														0.10			
Montgomery, Ala.	10-11			2.20														0.71			
Nantucket, Mass.	20			0.77														0.27			
Nashville, Tenn.	18-19			0.57														0.20			
New Orleans, La.	10-11	1.45 p.m.	1.00 a.m.	2.73	1.55 p.m.	2.25 p.m.	0.02	0.12	0.23	0.39	0.56	0.70	0.80								
New York, N. Y.	11-12			2.11														0.42			
Norfolk, Va.	19-20			0.87														0.33			
Northfield, Vt.	20-21			0.52														0.06			
Oklahoma, Okla.	9-10			0.15														0.08			
Omaha, Nebr.	8-9			0.14														0.06			
Parkersburg, W. Va.	18			1.11														0.23			
Philadelphia, Pa.	11-12			2.05														0.33			
Pittsburg, Pa.	11			0.50														*			
Pocatello, Idaho	14			0.22														0.06			
Portland, Me.	28-29			1.84														0.41			
Portland, Oreg.	12			0.74														0.20			
Raleigh, N. C.	11			1.02														0.41			
Richmond, Va.	11			0.87														0.30			
Rochester, N. Y.	20			1.11														0.28			
St. Louis, Mo.	17			0.27														0.11			
St. Paul, Minn.	13			0.15														0.14			
Salt Lake City, Utah	8			0.19														*			
San Diego, Cal.	3-4			0.66														0.17			
San Francisco, Cal.	2-3			1.56														0.35			
Savannah, Ga.	17-18			2.13														0.44			
Seattle, Wash.	5			0.50														0.20			
Spokane, Wash.	2-3			0.42														*			
Tampa, Fla.	11-12	2.38 p.m.	1.15 a.m.	1.24	4.45 p.m.	5.10 p.m.	0.34	0.08	0.21	0.33	0.40	0.70	0.74								
Vicksburg	10-11			1.12														0.34			
Washington, D. C.	11-12			0.93														0.20			
Wilmington, N. C.	11	11.50 a.m.	4.55 p.m.	1.67	4.12 p.m.	4.40 p.m.	1.13	0.19	0.31	0.45	0.47	0.49	0.54								
Do	18-19	6.25 p.m.	8.25 a.m.	2.74	5.20 a.m.	6 30 a.m.	1.51	0.09	0.11	0.16	0.23	0.30	0.36	0.41	0.48	0.52	0.55	0.82	0.96	1.11	1.28
Yankton, S. Dak.	1			0.02														*			
Basseterre, St. Kitts	31			0.15									0.14								
Bridgetown, Barbados	7			0.24														0.10			
Cienfuegos, Cuba	12			0.82							0.32										
Havana, Cuba	19-20			1.02														0.47			
Port of Spain, Trin.	22			2.23														0.49			
Puerto Principe, Cuba	24	1.47 p.m.	3.25 p.m.	0.77	2.14 p.m.	2.29 p.m.	0.15	0.29	0.46	0.55	0.56	0.58									
Do	28	2.18 p.m.	5.15 p.m.	1.34	2.30 p.m.	2.47 p.m.	0.03	0.28	0.53	0.57	0.63										
Roseau, Dom., W. I.	4-5			0.19														0.10			
San Juan, Puerto Rico	27			0.75														0.54			
Santiago de Cuba	24			0.35							0.35										
Santo Domingo, S. D.	6	11.00 a.m.	5.55 p.m.	1.50	1.10 p.m.	2.00 p.m.	0.16	0.10	0.26	0.46	0.64	0.77	0.83	0.90	0.96	1.01	1.04	1.09	1.13		
Willemstad, Curaçao	6			0.25											0.25						

* Self-register not working.

TABLE X.—*Data furnished by the Canadian Meteorological Service, January, 1900.*

Stations.	Pressure.			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F.	29.75	29.90	+.06	28.7	+ 4.9	36.5	20.9	6.37	+0.43	3.2
Sydney, C. B. I.	29.90	29.94	+.04	27.9	+ 7.4	37.3	18.5	8.87	+4.06	11.5
Halifax, N. S.	29.86	29.97	+.01	28.6	+ 6.8	39.2	18.1	8.52	+2.83	9.5
Grand Manan, N. B.	29.90	29.95	—.04	26.7	+ 3.3	36.6	16.8	7.65	+2.28	15.1
Yarmouth, N. S.	29.90	29.98	—.04	29.8	+ 3.5	38.6	21.0	7.08	+1.81	16.5
Charlottet'n, P. E. I.	29.87	29.91	—.05	23.7	+ 6.7	33.3	14.2	2.86	—0.55	4.9
Chatham, N. B.	29.88	29.90	—.12	14.6	+ 4.8	27.3	2.0	4.88	+1.58	28.4
Father Point, Que.	29.85	29.88	—.15	14.1	+ 6.1	25.2	2.9	2.51	—0.19	25.1
Quebec, Que.	29.62	29.98	—.08	13.3	+ 4.2	22.4	4.1	3.61	—0.06	27.6
Montreal, Que.	29.78	30.00	—.08	16.5	+ 4.8	26.3	6.8	5.82	+2.54	36.4
Bissett, Ont.	29.37	30.03	—.03	9.9	+ 3.4	22.6	— 2.8	1.65	—0.36	12.7
Ottawa, Ont.	29.65	29.99	—.08	15.2	+ 5.6	25.7	4.6	2.74	....	25.4
Kingston, Ont.	29.68	30.02	—.06	20.8	+ 3.7	30.2	11.3	3.52	+0.26	19.5
Toronto, Ont.	29.62	30.02	—.07	26.0	+ 4.6	33.5	18.6	1.94	—0.57	14.7
White River, Ont.	28.56	30.01	—.10	6.9	+ 7.3	20.2	— 6.4	1.44	+0.11	14.4
Port Stanley, Ont.	29.37	30.05	—.04	26.2	+ 4.0	32.7	19.7	2.56	—0.12	16.5
Saugeen, Ont.	29.24	30.00	—.06	24.2	+ 3.8	30.9	17.4	2.94	—0.52	27.2
Parry Sound, Ont.	29.25	29.99	—.09	18.7	+ 4.9	28.2	9.3	5.00	+1.85	46.2
Port Arthur, Ont.	29.22	29.97	—.14	14.8	+11.7	25.9	3.7	0.85	+0.04	8.5
Winnipeg, Man.	29.16	30.06	—.13	6.6	+13.4	17.6	— 4.4	1.05	+0.39	10.5
Minnedosa, Man.	28.12	30.06	—.11	9.5	+16.7	21.2	— 2.2	1.00	+0.37	10.0
Qu'Appelle, Assin.	27.64	30.04	—.13	10.8	+14.6	20.8	0.7	0.24	—0.14	2.3
Medicine Hat, Assin.	27.62	30.01	—.18	24 6	+19.1	36.8	12.5	0.47	+0.14	4.7
Swift Current, Assin.	27.36	30.06	—.13	21.7	+18.6	32.3	11.2	0.14	—0.47	1.2
Calgary, Alberta	26.29	29.97	—.22	22.0	+13.6	31.8	12.3	0.25	—0.32	2.5
Banff, Alberta	25.25	30.04	......	23.4	+11.3	31.3	15.6	1.12	....	11.2
Edmonton, Alberta	27.55	29.98	—.17	17.1	+15.3	27.0	7.2	0.78	+0.05	6.0
Prince Albert, Sask.	28.36	30.04	......	3.1	+11.5	14.5	— 8.4	0.95	—0.01	9.5
Battleford, Sask.	28.21	30.08	......	6.9	+12.8	16.8	— 3.0	0.63	+0.25	6.3
Kamloops, B. C.	28.[illegible]9	30.11	......	33.8	+10.8	38.6	29.0	0.44	—0.42	2.0
Victoria, B. C.	29.94	30.03	......	43.3	+ 4.8	47.0	39.6	3.60	—2.07	0.0
Barkerville, N. W. T.	25.51	29.95	......	23.5	+ 5.7	31.2	15.7	1.82	—0.89	18.2
Hamilton, Bermuda.	29.97	30.13	+.03	62.7	+ 0.7	67.3	58.0	5.48	+0.63	0.0

TABLE XI.—*Heights of rivers referred to zeros of gages, January, 1900.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.*	1,954	14						
Reeds Landing, Minn	1,884	12	1.0	3	0.1	22-27	0.4	0.9
La Crosse, Wis*	1,819	12						
North McGregor, Iowa.*	1,759	18						
Dubuque, Iowa.*	1,699	15						
Leclaire, Iowa.*	1,609	10						
Davenport, Iowa †	1,593	15						
Muscatine, Iowa	1,562	16	5.4	2	2.5	27-29	3.8	2.9
Galland, Iowa[1]	1,472	8	1.6	22-24	0.5	15	1.1	1.1
Keokuk, Iowa[2]	1,463	15	4.2	8,9	−0.5	29	1.8	4.7
Hannibal, Mo.[2]	1,402	13	3.6	20	−0.3	31	2.3	3.9
Grafton, Ill	1,306	23	5.9	21	1.1	1	3.9	4.8
St. Louis, Mo	1,264	30	7.7	21	−2.6	2	3.2	10.3
Chester, Ill	1,189	36	4.9	22	−4.1	3	1.3	9.0
Memphis, Tenn	843	33	17.3	29	3.3	10	8.9	14.0
Helena, Ark	767	42	23.9	30	6.4	15	13.2	17.5
Arkansas City, Ark	635	42	24.5	31	7.7	14	14.0	16.8
Greenville, Miss	595	42	19.9	31	5.9	14,15	11.2	14.0
Vicksburg, Miss	474	45	20.1	31	4.6	16	10.6	15.5
New Orleans, La	108	16	5.5	31	3.0	22	3.9	2.5
Missouri River.								
Bismarck, N. Dak.	1,309	14	4.2	30,31	1.6	1,2	3.0	2.6
Pierre, S. Dak*	1,114	14						
Sioux City, Iowa*	784	19						
Omaha, Nebr*	669	18						
Plattsmouth, Nebr	641	17						
St. Joseph, Mo	481	10	2.5	15	−2.3	31	0.5	4.8
Kansas City, Mo	388	21	6.5	15	4.2	5	5.4	2.3
Boonville, Mo	199	20	5.3	1	3.3	12	4.5	2.0
Hermann, Mo[10]	103	24	7.0	19	2.6	10	3.4	4.4
Illinois River.								
Peoria, Ill	135	14	8.1	25-27	4.9	9	6.2	3.2
Gasconade River.								
Arlington, Mo	58	16	0.8	22	−1.2	1-17	−0.6	2.0
Youghiogheny River.								
Confluence, Pa	59	10	6.0	9,10	1.1	3-5	3.0	4.9
West Newton, Pa.[3]	15	23	7.8	21	1.2	31	3.5	6.6
Allegheny River.								
Warren, Pa	177	14	9.3	21	1.4	4,5	3.8	7.9
Oil City, Pa	123	13	9.5	22	2.0	5,6	4.4	7.5
Parker, Pa[3]	73	20	20.0	12	3.0	31	6.6	17.0
Monongahela River.								
Weston, W. Va.[4]	161	18	3.5	21	−0.6	6	0.4	4.1
Fairmont, W. Va.[8]	119	25	8.3	12	1.3	31	2.8	7.0
Greensboro, Pa.[5]	81	18	13.3	21	7.0	2-7	8.5	6.3
Lock No. 4, Pa.	40	28	15.5	22	7.1	31	9.3	8.4
Conemaugh River.								
Johnstown, Pa	64	7	6.6	21	1.8	31	2.6	4.8
Red Bank Creek.								
Brookville, Pa	35	8	2.7	21	1.4	1-15	1.7	1.3
Beaver River.								
Ellwood Junction, Pa[1]	10	14	5.0	13	2.5	18-20, 23-25	3.2	2.5
Great Kanawha River.								
Charleston, W. Va	61	30	11.5	22	1.9	3	4.9	9.6
New River.								
Hinton, W. Va	95	14	5.5	21	1.1	1-3	2.3	4.4
Cheat River.								
Rowlesburg, W. Va.[1]	36	14	6.5	21	3.0	18,20	4.1	3.5
Ohio River.								
Pittsburg, Pa	966	22	17.8	22	1.8	3,4	7.0	16.0
Davis Island Dam, Pa	960	25	16.9	22	3.6	3	8.1	13.3
Wheeling, W. Va.[6]	875	36	21.3	23	7.7	1	12.9	15.6
Parkersburg, W. Va.[4]	785	36	22.2	24	4.3	8	13.0	17.9
Point Pleasant, W. Va	703	39	25.8	24	2.8	4	12.6	23.0
Huntington, W. Va	660	50	28.8	24	5.5	5	16.0	23.3
Catlettsburg, Ky	651	50	29.5	21	3.3	5	15.2	26.2
Portsmouth, Ohio	612	50	30.0	21,25	4.9	6	16.4	25.1
Cincinnati, Ohio	499	50	31.8	23,24	7.3	10,11	18.7	24.5
Madison, Ind	413	46	27.1	24	8.0	11	16.7	19.1
Louisville, Ky	367	28	11.6	24	4.2	10	8.1	7.4
Evansville, Ind	184	35	26.0	25	5.5	11	15.4	20.5
Paducah, Ky	47	40	22.9	26	5.6	11	13.6	17.3
Cairo, Ill	1,073	45	25.5	27	7.8	11	15.8	17.7
Muskingum River.								
Zanesville, Ohio.	70	20	13.3	13	6.4	2-5,11	8.7	6.9
Scioto River.								
Columbus, Ohio[8]	110	17	8.0	21	1.6	11	4.4	6.4
Miami River.								
Dayton, Ohio	69	18	6.8	21	1.0	11	2.1	5.8
Wabash River.								
Mount Carmel, Ill.[7]	50	15	7.6	25	2.5	12	5.3	5.1
Licking River.								
Falmouth, Ky.[5]	30	25	8.9	21,22	2.5	11	5.3	6.4
Clinch River.								
Speers Ferry, Va	156	20	3.8	13	0.2	5,6,31	0.9	3.6
Clinton, Tenn.[6]	46	25	10.5	14	4.0	2,6,31	6.1	6.5
Tennessee River.								
Knoxville, Tenn	614	29	5.3	14	0.5	2	2.0	4.8
Kingston, Tenn.[9]	534	25	5.8	14	1.5	8	3.6	4.3
Chattanooga, Tenn.[4]	430	33	9.4	21	2.1	6	5.7	7.3
Bridgeport, Ala	390	24	8.0	21	0.7	4	3.8	7.3
Florence, Ala	220	16	9.6	22	1.1	7-9	4.9	8.5
Riverton, Ala	190	25	12.5	23	0.4	8	6.2	12.1
Johnsonville, Tenn	94	21	13.3	24	2.0	11	7.7	11.3

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Cumberland River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Burnside, Ky.[4]	434	50	14.2	13	1.6	10	4.7	12.6
Carthage, Tenn	257	40	13.0	21	2.0	10	6.4	11.0
Nashville, Tenn	175	40	17.4	20,22	3.2	10	9.9	14.2
Arkansas River.								
Wichita, Kans	726	10	2.5	18-22	1.8	6	2.2	0.7
Webbers Falls, Ind. T.	413	23	3.0	7	2.0	31	2.3	1.0
Fort Smith, Ark	351	22	5.9	13	2.8	31	4.1	3.1
Dardanelle, Ark	256	21	6.8	19	2.8	6-8,31	4.1	4.0
Little Rock, Ark	176	23	9.8	20	3.7	8,9	6.1	6.1
White River.								
Newport, Ark	150	26	11.0	23	2.6	10	4.9	8.4
Yazoo River.								
Yazoo City, Miss	80	25	5.0	1	0.9	10	2.7	4.1
Red River.								
Arthur City, Tex. ‡	688	27						
Fulton, Ark	565	28	15.0	16	7.0	31	10.3	8.0
Shreveport, La	449	29	9.3	1,19,20	5.5	11,12,13	7.5	3.8
Alexandria, La	139	33	7.8	1,2	3.8	22	5.9	4.0
Ouachita River.								
Camden, Ark	340	39	21.3	21	5.2	8,9,10	10.0	16.1
Monroe, La	100	40	12.3	27	2.8	9	7.2	9.5
Atchafalaya River.								
Melville, La	100*	31	19.0	31	11.5	18-20	14.6	7.5
Susquehanna River.								
Wilkesbarre, Pa	178	14	15.0	22	2.9	16-18	5.4	12.1
Harrisburg, Pa	70	17	12.0	23	1.7	2	5.2	10.3
W. Br. of Susquehanna.								
Williamsport, Pa	35	20	14.5	21	2.5	8	4.4	12.0
Juniata River.								
Huntingdon, Pa	80	24						
Potomac River.								
Harpers Ferry, W. Va	170	16	8.0	22	1.4	8-13	2.6	6.6
James River.								
Lynchburg, Va.[4]	257	18	7.4	21	0.2	6,10,11	1.9	7.2
Richmond, Va.[4]	110	12	7.5	21,22	−2.0	10,11	0.2	9.5
Roanoke River.								
Weldon, N. C.	90	40	31.1	22	6.8	2	12.2	24.3
Cape Fear River.								
Fayetteville, N. C.	100	38	21.3	13	3.9	9	8.0	17.4
Lumber River.								
Fairbluff, N. C.	10	6	4.6	24,25	3.3	9-11	3.8	1.3
Edisto River.								
Edisto, S. C.	75	6	4.4	20	3.0	31	4.1	1.4
Pedee River.								
Cheraw, S. C.	145	27	15.2	14	1.0	4,5	4.2	14.2
Black River.								
Kingstree, S. C	60	12	6.1	5-7	3.9	1	5.4	2.2
Lynch Creek.								
Effingham, S. C.	35	12	7.6	21	4.5	8,9,29	5.8	3.1
Santee River.								
St. Stephens, S. C.	50	12	7.6	20,21	2.4	7,8	5.7	5.2
Congaree River.								
Columbia, S. C.	37	15	4.3	13	0.3	1-3,5,7	1.1	4.0
Wateree River.								
Camden, S. C.	45	24	15.0	14	3.1	3	6.2	11.9
Waccamaw River.								
Conway, S. C.	40	7	6.2	31	1.3	13	3.3	4.9
Savannah River.								
Calhoun Falls, S. C.	347							
Augusta, Ga	268	32	14.6	13	6.5	5,8	8.2	8.1
Broad River.								
Carlton, Ga	30		5.8	12	2.3	5-9,30,31	2.8	3.5
Flint River.								
Albany, Ga	80	20	4.7	1	1.2	10,11	2.7	3.5
Chattahoochee River.								
Westpoint, Ga	239	20	5.1	22	2.4	5	3.5	2.7
Ocmulgee River.								
Macon, Ga	125	20	4.6	21	1.2	3-5	2.3	3.4
Oconee River.								
Dublin, Ga	60	17	5.7	15	1.2	9	2.8	4.5
Coosa River.								
Rome, Ga	225	30	11.3	20	1.5	3-10	3.8	9.8
Gadsden, Ala	144	18	13.8	21	0.9	5-10	4.9	12.9
Alabama River.								
Montgomery, Ala	265	35	16.0	23	2.2	8-10	7.7	13.8
Selma, Ala	212	35	18.5	23	2.7	9,10	9.5	15.8
Tombigbee River.								
Columbus, Miss	285	33	8.3	13	0.4	31	2.3	7.9
Demopolis, Ala.[5]	155	35	33.3	17	4.3	10	16.4	29.0
Black Warrior River.								
Tuscaloosa, Ala	90	43	32.6	21	4.5	10	15.1	28.1
Columbia River.								
Umatilla, Oreg	270	25	8.8	14,15	5.1	31	6.4	3.7
The Dalles, Oreg	166	40	15.9	16	7.7	31	9.9	8.2
Willamette River.								
Albany, Oreg	99	20	24.0	15	5.9	31	10.0	18.1
Portland, Oreg	10	15	16.7	17	5.6	29-31	9.3	11.1
Sacramento River.								
Red Bluff, Cal	241	23	24.7	3	2.7	31	9.4	22.0
Sacramento, Cal	70	29	27.0	9	21.7	31	24.4	5.3

* Frozen. † Frozen for 21 days. ‡ No gage.
[1] For 17 days only. [2] For 23 days only. [3] For 20 days only. [4] For 26 days only.
[5] For 30 days only. [6] For 27 days only. [7] For 19 days only. [8] For 18 days only.
[9] For 24 days only. [10] For 25 days only.

7——7

Chart I. Tracks of Centers of High Areas. January, 1900.

Chart I. Tracks of Centers of High Areas. January, 1900.

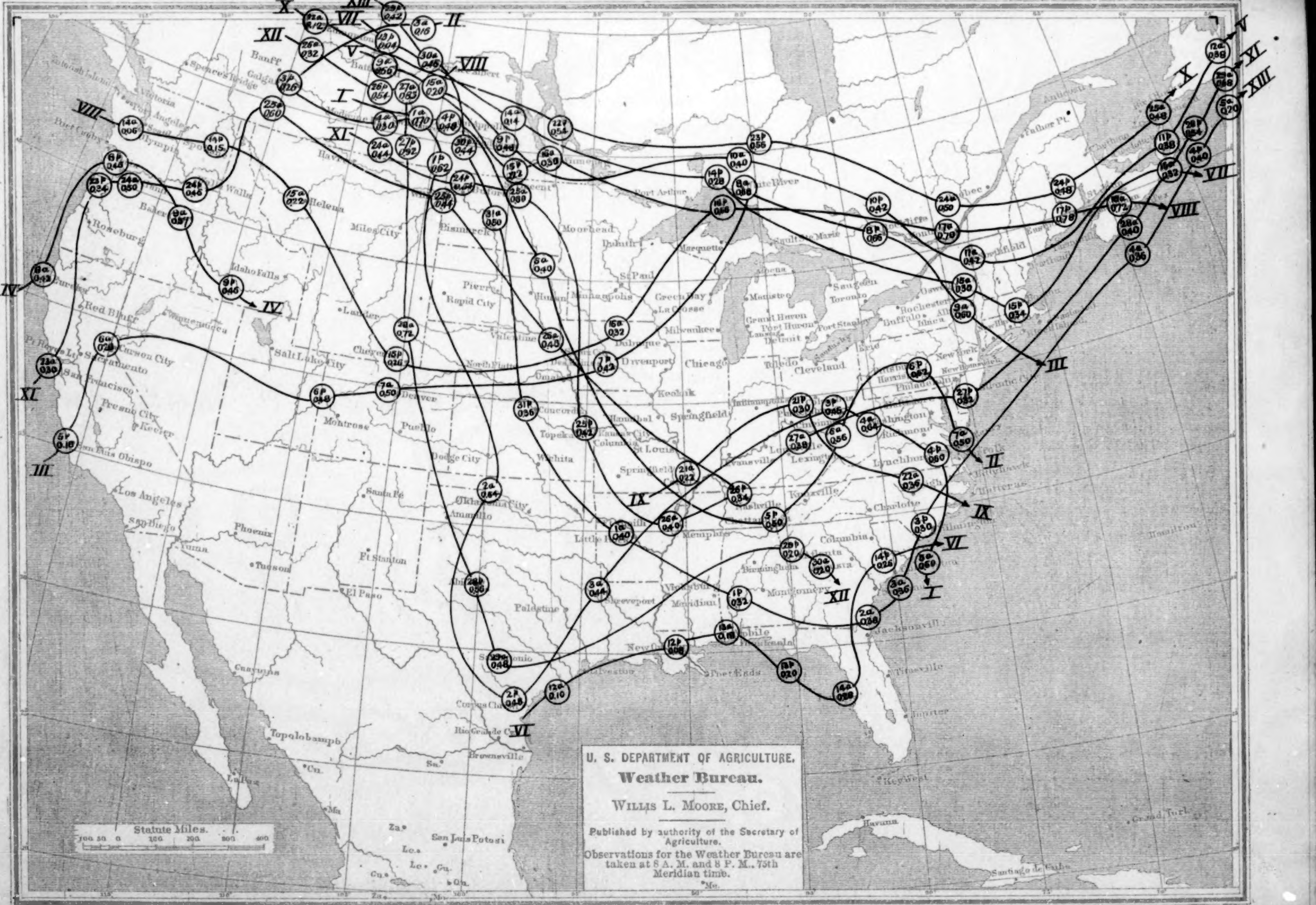

Chart II. Tracks of Centers of Low Areas. January, 1900.

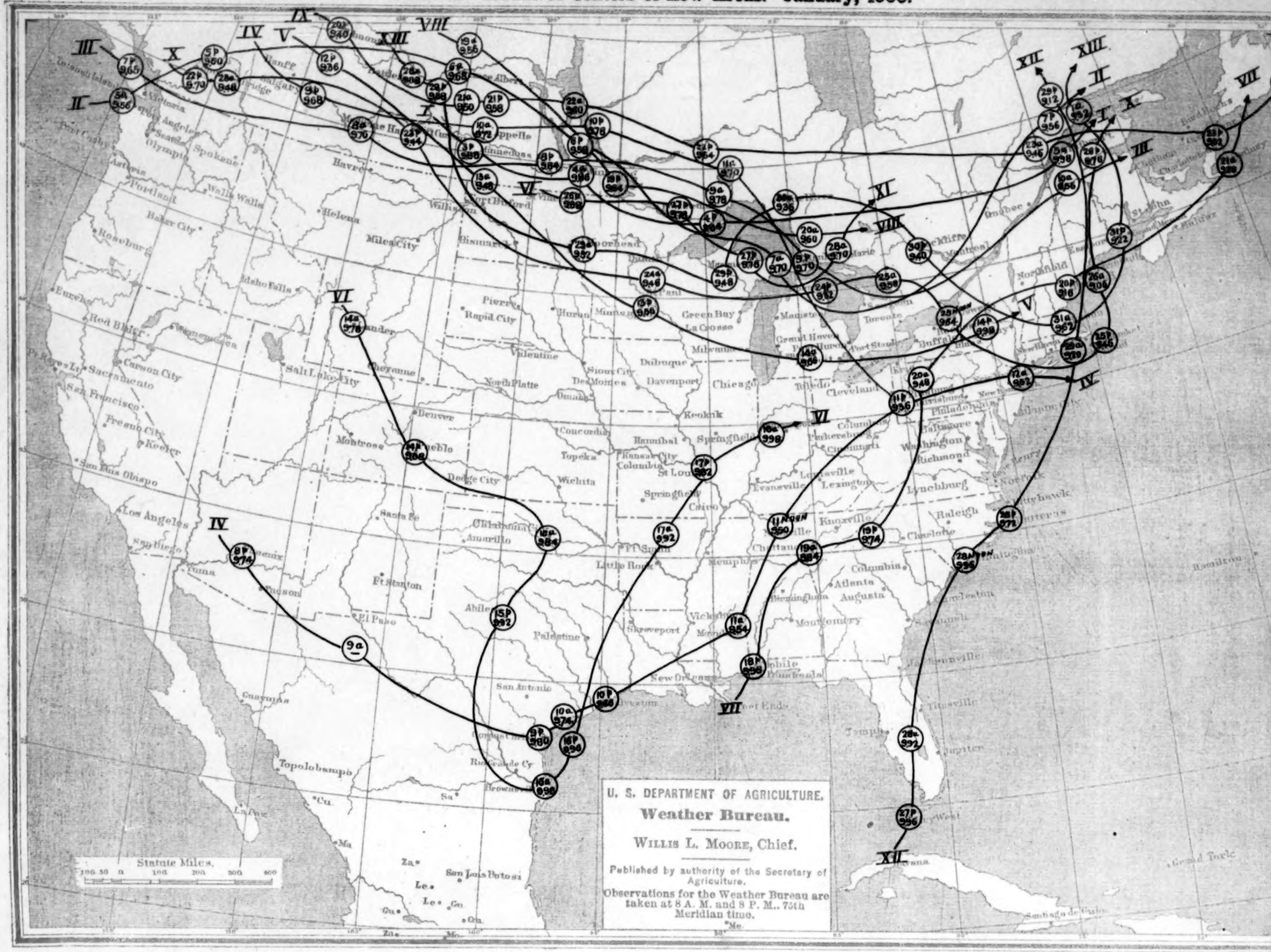

Chart III. Total Precipitation. January, 1900.

Chart III. Total Precipitation. January, 1900.

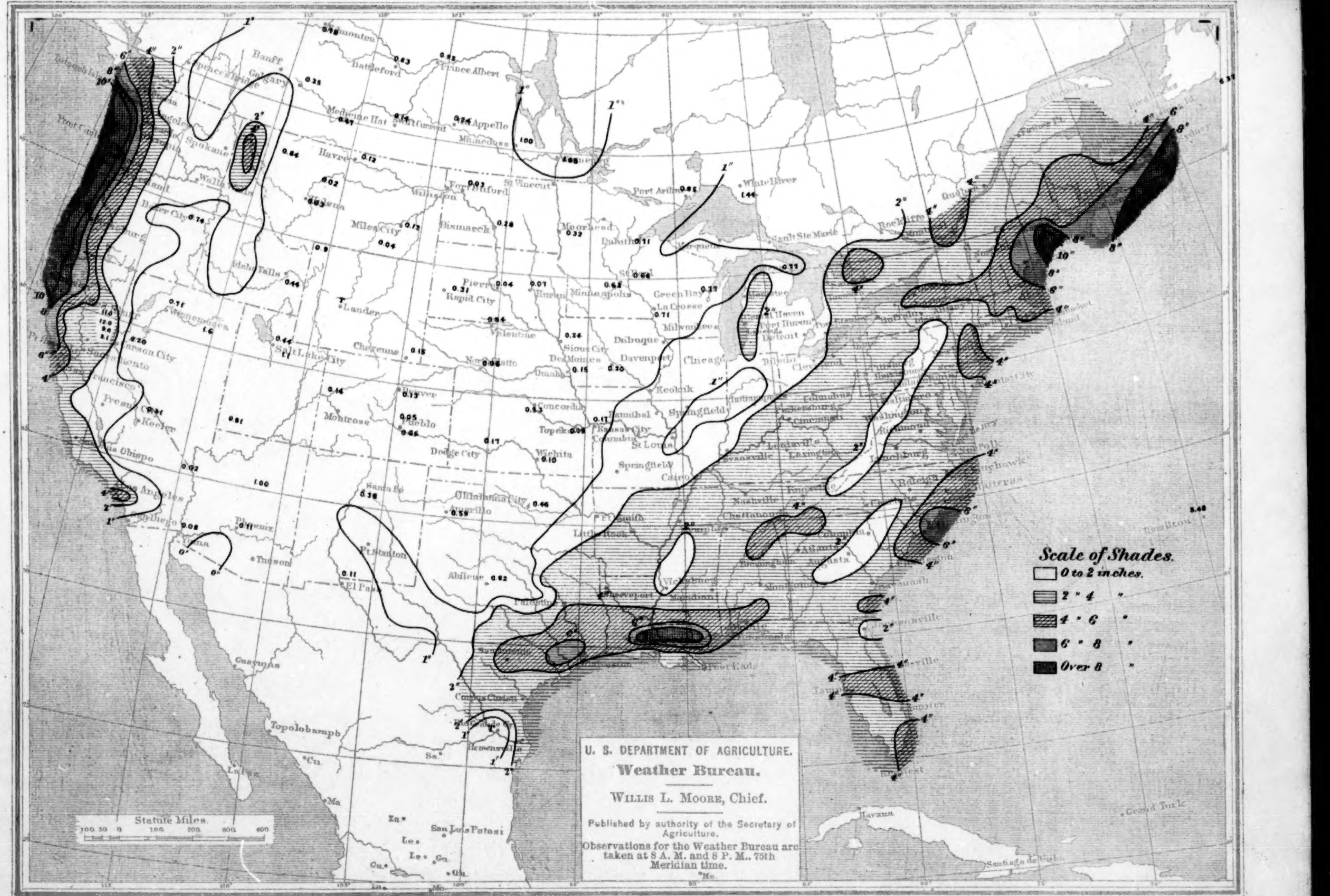

Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. January, 1900.

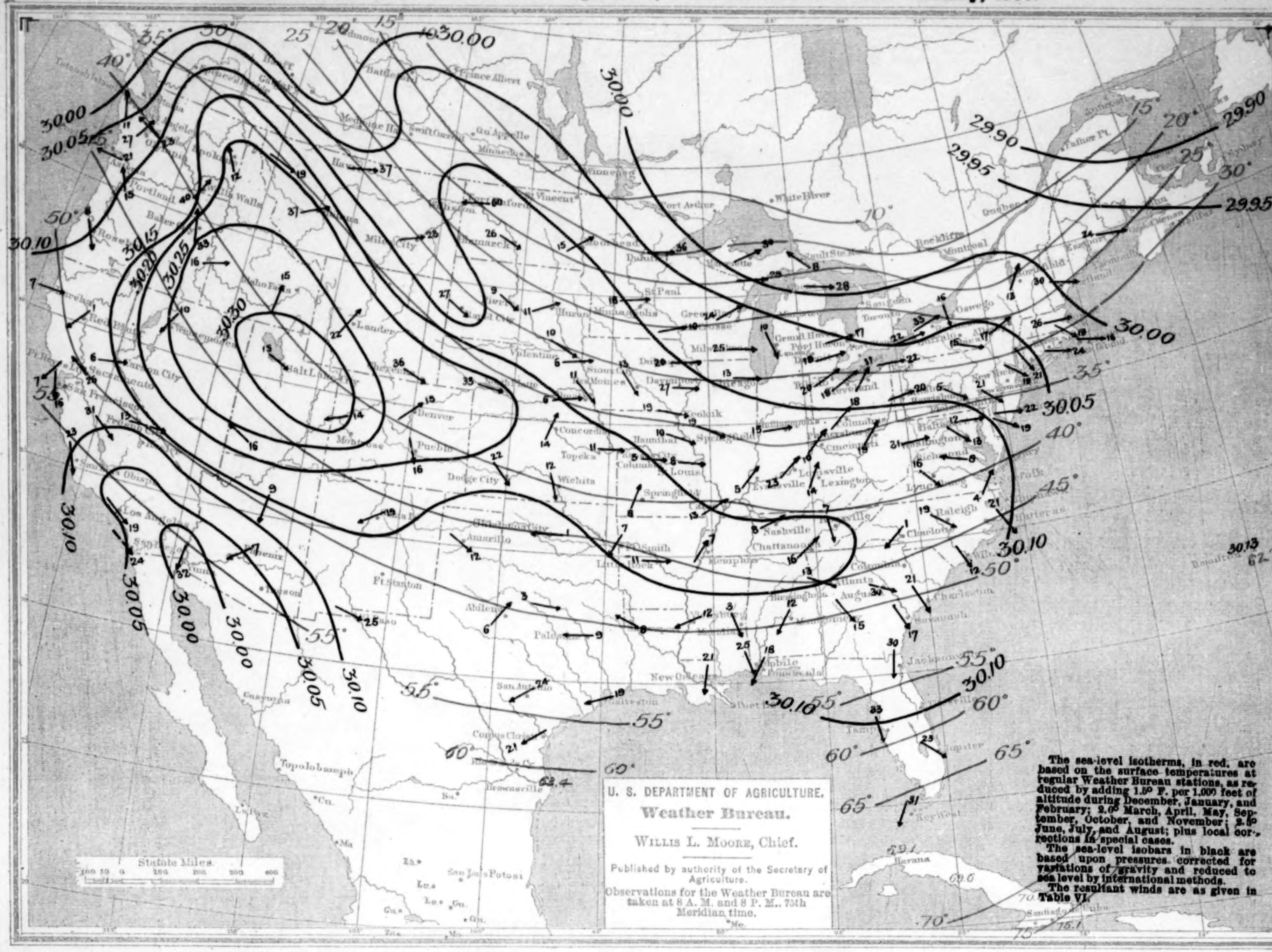

Chart V. Hydrographs for Seven Principal Rivers of the United States. January, 1900.

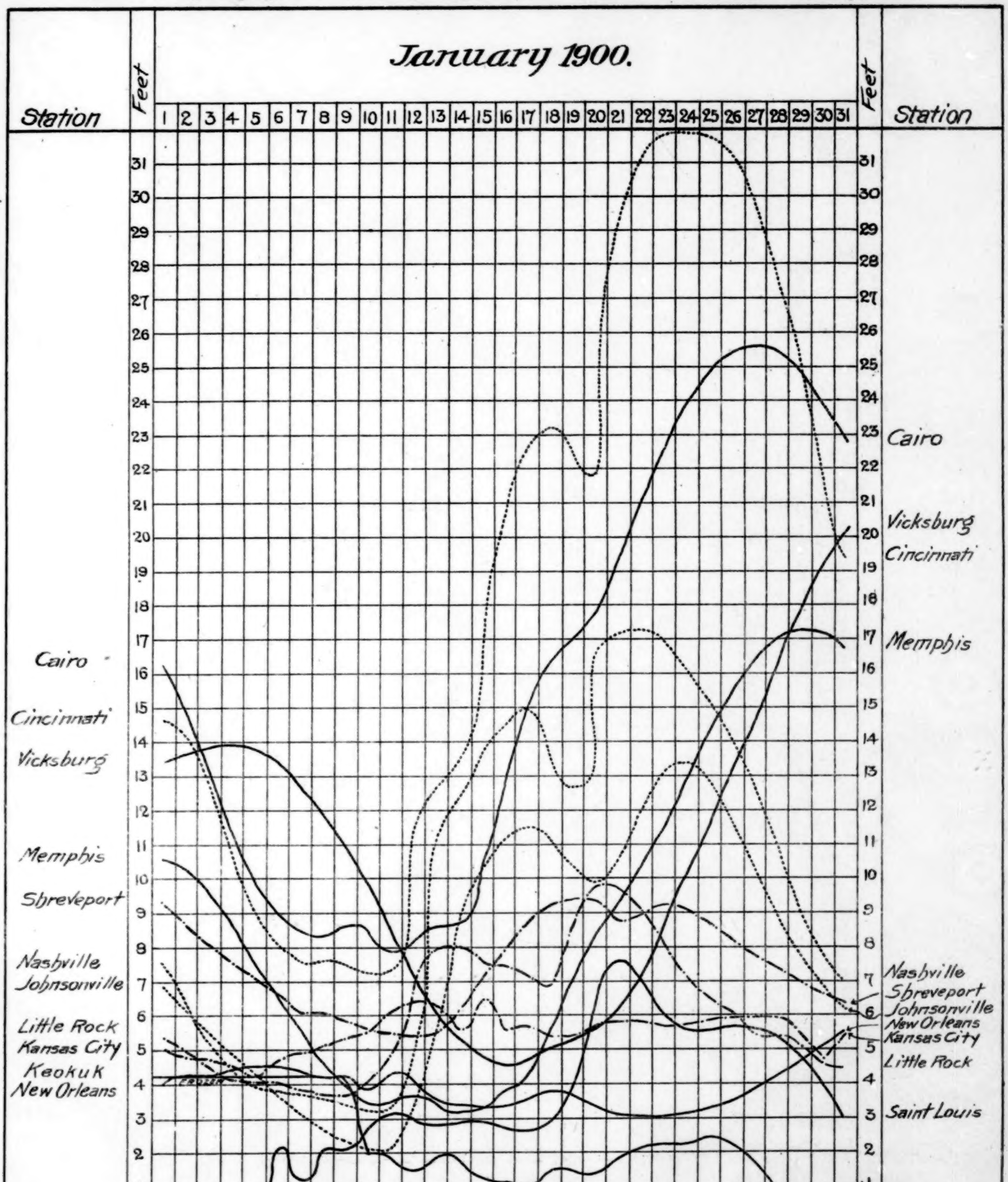

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. January, 1900.

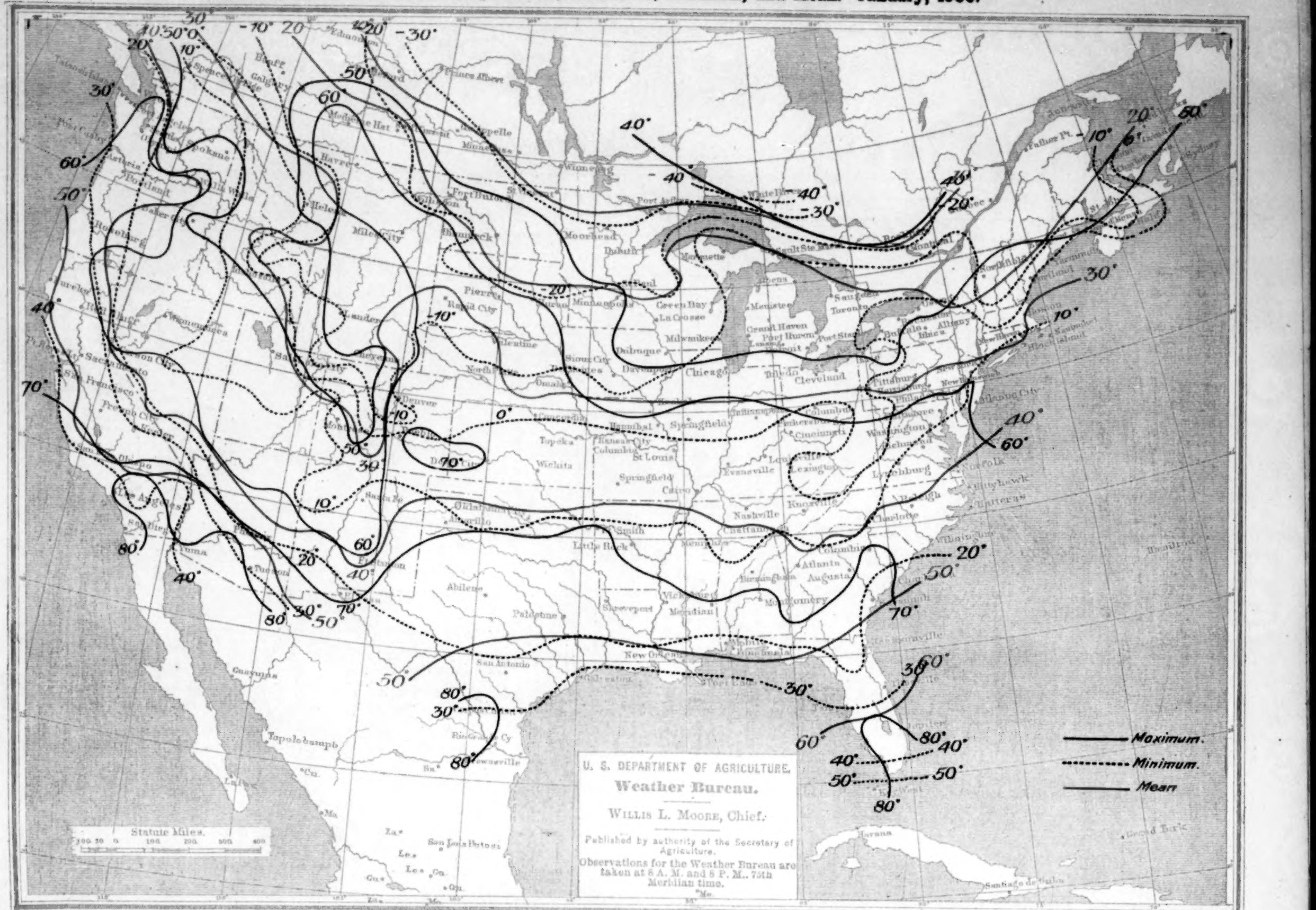

Chart VII. Percentage of Sunshine. January, 1900.

Chart VII. Percentage of Sunshine. January, 1900.

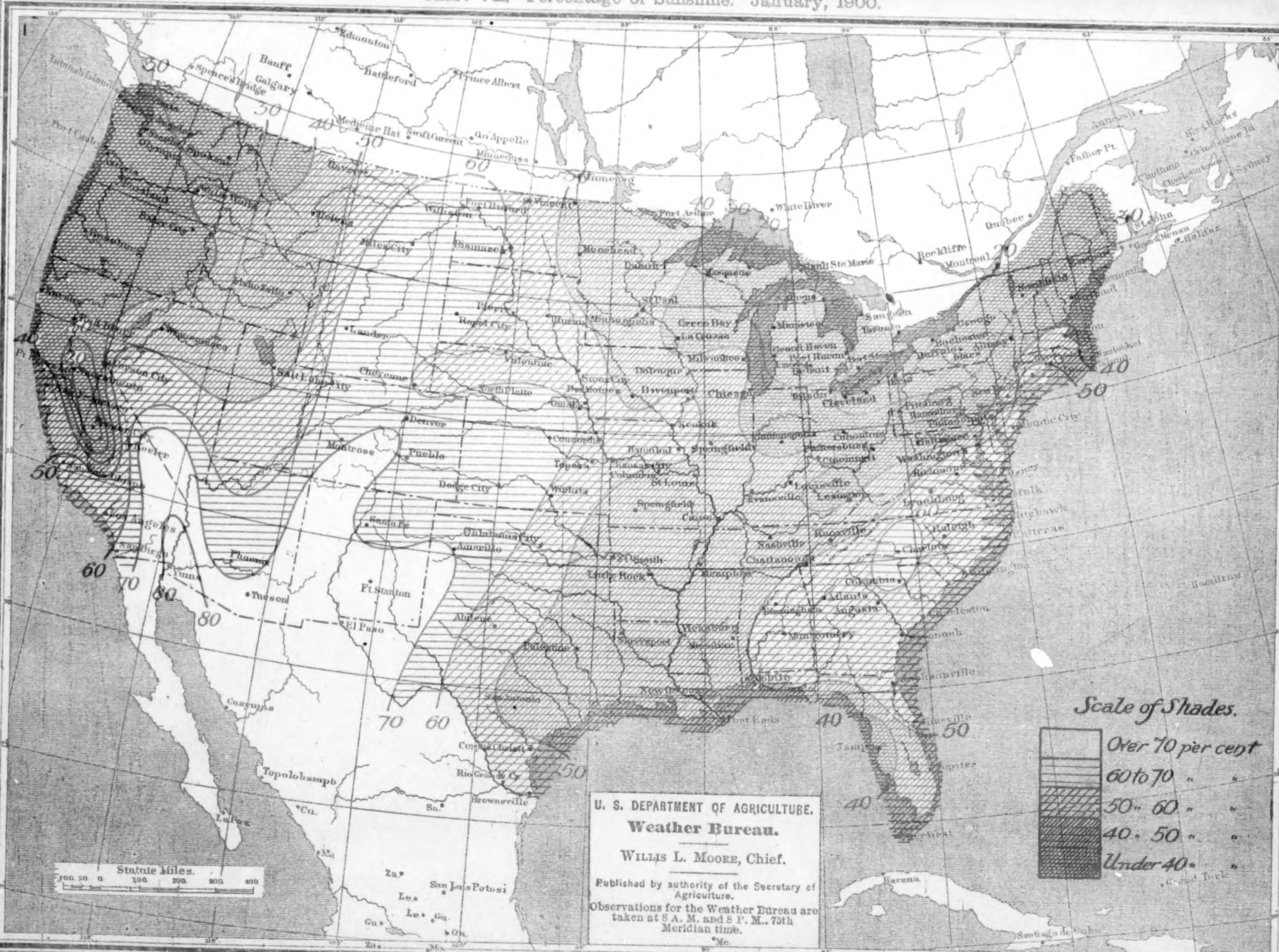

Chart VIII. Total Snowfall for January, 1900.

Chart IX. Snow on Ground on January 31, 1900.

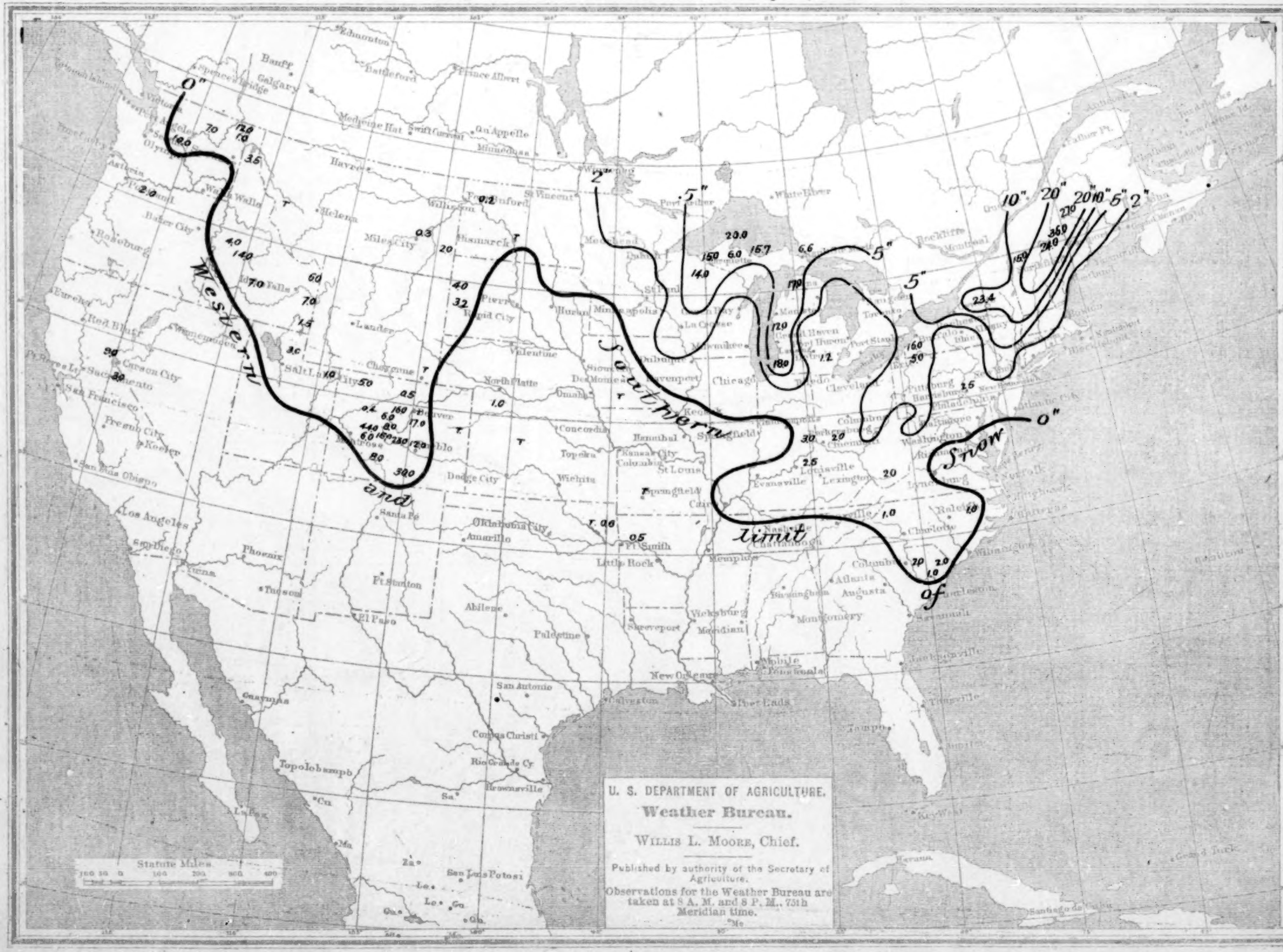

Chart X. West Indian Monthly Isobars, Isotherms, and Resultant Winds. January, 1900.